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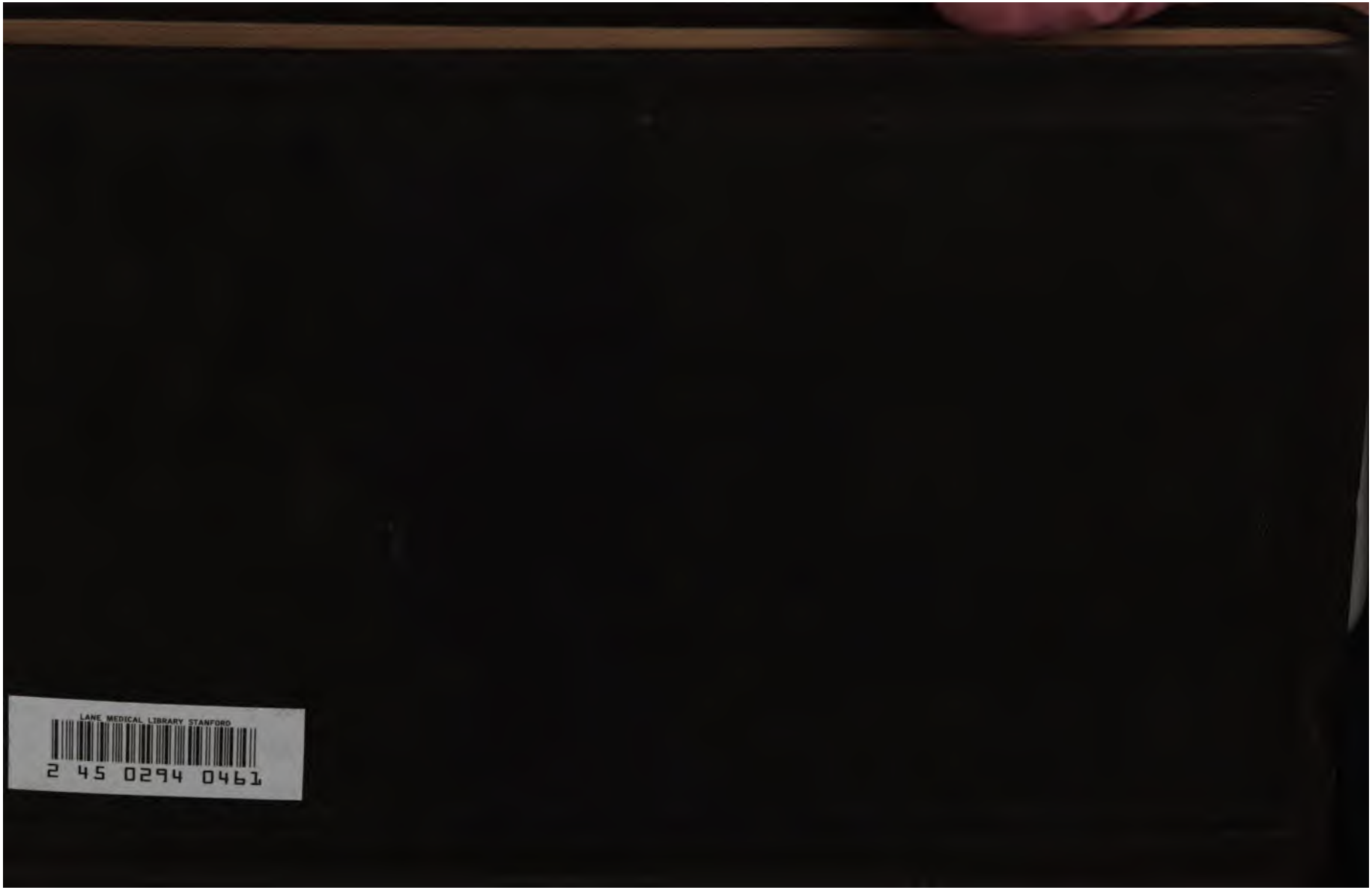
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FOURTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

STATE BOARD OF HEALTH

LANE LIBRARY OF THE STATE OF MICHIGAN

FOR THE

FISCAL YEAR ENDING SEPT. 30, 1876.



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Office of the Secretary of the State Board of Health,
Lansing, Michigan, November, 1876.

To JOHN J. BAGLEY, *Governor of Michigan:*

SIR:—In compliance with the laws of this State, I present to you the accompanying Report for the fiscal year ending September 30, 1876.

Very respectfully,

HENRY B. BAKER,

Secretary of the State Board of Health.

RESOLUTION OF THE BOARD RELATIVE TO PAPERS PUBLISHED IN ITS ANNUAL REPORT.

Resolved, That no papers shall be published in the Annual Report of this Board except such as are ordered or approved for purposes of such publication by a majority of the members of the Board; and that any such paper shall be published over the signature of the writer, who is entitled to the credit of its production, as well as responsible for the statements of facts and opinions expressed therein.

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REPORT.

This is the Fourth Annual Report of the Secretary of the Michigan State Board of Health, and is for the fiscal year ending September 30, 1876. Besides the report of the work of the Board, etc., by the Secretary, it contains twelve special papers bearing closely upon different subjects relating to the public health and safety. Nine of the articles are by members of the Board, two are made up of replies by the regular correspondents of the Board, and the remaining one is by a physician of Lansing, lately a member of the local Board of Health. These papers are all of such importance that there seems no occasion for asking especial attention to any one of them. It is hoped that each and every one of them will find interested readers, and that in different spheres each will accomplish good.* They are published under the same resolution that has governed the subject in previous Reports, and which is here printed because it states definitely the exact conditions of their publication:

"*Resolved*, That no papers shall be published in the Annual Report of this Board except such as are ordered or approved for purposes of such publication by a majority of the members of the Board; and that any such paper shall be published over the signature of the writer, who is entitled to the credit of its production, as well as responsible for the statements of facts and opinions expressed therein."

MEMBERS OF THIS STATE BOARD OF HEALTH.

At the close of the fiscal year, the names and postoffice addresses of the members of this Board are as follows:

HOMER O. HITCHCOCK, M. D., President,	Kalamazoo.
ROBERT C. KEDZIE, M. D.,	Agr'l College, Lansing.
REV. CHARLES H. BRIGHAM,	Ann Arbor.
HENRY F. LYSTER, M. D.,	Detroit.
REV. JOHN S. GOODMAN,	East Saginaw.
ARTHUR HAZLEWOOD, M. D.,	Grand Rapids.
HENRY B. BAKER, M. D., Secretary of the Board, and Supt. of Vital Statistics,	Office at Lansing.

* As regards one of them, "Means of Escape from Public Buildings in case of Fire," since it has been printed a very remarkable and terrible incident has attracted the attention of this whole country to the importance of the subject of better provision for rapid egress from public halls, theaters, schools, churches, hotels, etc. The great loss of life at the Brooklyn theater is only an example of what may occur in many places, even in this State, unless something is done in the direction of prevention. In such matters, "experience teaches a dear school," and it is certainly to be hoped that the people of this State have sufficient intelligence and forethought to accept and profit by the experiences of others, already made public.

STANDING COMMITTEES.

The work of the Board is facilitated by having standing committees on some of the important subjects relating to the public health. These standing committees now consist of only one member. An exception to this rule is made for committee No. 12, on Public Health Legislation. The numbers, subjects, and names of members of these regular committees are now as follows:

1. Epidemic, Endemic, and Contagious Diseases—Arthur Hazlewood, M. D.
2. Sewerage and Drainage—Henry F. Lyster, M. D.
3. Food, Drinks, and Water Supply—Arthur Hazlewood, M. D.
4. Buildings, public and private, including Ventilation, Heating, etc.—Robert C. Kedzie, M. D.
5. Climate, general and by season of year, and as related to age of inhabitants—Henry F. Lyster, M. D.
6. Disposal of Excreta and Decomposing Organic Matter—Homer O. Hitchcock, M. D.
7. Poisons, Explosives, Chemicals, Accidents, and Special Sources of Danger to Life and Health—Robert C. Kedzie, M. D.
8. Occupations and Recreations—Rev. Charles H. Brigham.
9. Education,—The relation of Schools to Health, the kind and methods of Instruction in use, and methods to be proposed—Rev. John S. Goodman.
10. Geology and Topography; Influence on Health, of Forest Trees and their removal, Shade Trees near Dwellings, etc.—Rev. Charles H. Brigham.
11. The Death-rate as influenced by Age, Climate, and Social Condition—Henry B. Baker, M. D.
12. Legislation in the interests of Public Health—Homer O. Hitchcock, M. D., Henry B. Baker, M. D., and Robert C. Kedzie, M. D.
13. Finances—Rev. John S. Goodman.

WORK OF THE BOARD.

METEOROLOGICAL OBSERVATIONS.

During the year the Board has established a few more Meteorological Stations in different parts of the State. Observations of the temperature, atmospheric pressure, humidity, rain-fall, winds, clouds, ozone, and casual phenomena, are in most instances made, recorded and reported to this Board. In one instance, that of the observer at Detroit, regular tests were continued for some time for the relative amount of sulphurous acid gas present, at different times, in the atmosphere. This was done for several purposes, and partly in order to ascertain what influence was thus exerted upon the test employed (Schönbein's) for ozone. It certainly seems desirable that systematic provision be made for inaugurating regular and continuous observations on this subject in different parts of the State, with a view to learning the actual and comparative condition of city and country air in this respect.

Mention should be made of the receipt of various contributions of meteorological data from the U. S. Signal Station at Detroit, through the courtesy of Theo. V. Van Heusen, of that station.

The following is a list of the Meteorological Observers in the State who send meteorological registers t this Board:

NAME.	LOCATION.	TIME COVERED BY REPORTS.
John Bell, M. D.	Benton Harbor	From Nov., 1875, to Oct., 1876.
Henry F. Thomas, M. D.	Allegan	From Nov., 1875, to Sept., 1876.
C. Henri Leonard, M. D.	Detroit	From Dec., 1875, to Oct., 1876.
E. H. Van Deusen, M. D.	Asylum, Kalamazoo	From Dec., 1875, to Oct., 1876.
Lyman P. Alden	State Public School, Coldwater	From Oct., 1875, to Oct., 1876.
Prof. R. C. Kedzie	Ag'l Coll., Lansing	For Oct., 1875, and Feb., 1876.
Prof. L. McLouth	State Normal School, Ypsilanti	From Dec., 1875, to Oct., 1876.
J. H. Kellogg, M. D.	Battle Creek	From Jan., 1876, to Oct., 1876.
James S. Reeves, M. D.	East Tawas	From Feb., 1876, to Oct., 1876.
C. M. Woodward, M. D.	Tecumseh	From March, 1876, to May, 1876.
Dr. E. Hause,	Tecumseh	From Dec., 1875, to Oct., 1876.
H. T. Calkins, M. D.	Fyfe Lake	From Jan., 1876, to Oct., 1876.
W. C. West, M. D.	Monroe	From Feb., 1876, to Oct., 1876.
Lee S. Cobb	Nirvana, Lake Co.	From Nov., 1873, to Oct., 1876.
John S. Caulkins, M. D.	Thornville, Lapeer Co.	Accepted the duty Oct. 27, 1876.
J. W. Thomas, Jr., M. D.	Norfolk, Va.	From July, 1876, to Oct., 1876.

ABSTRACTS AND BRIEF ACCOUNTS OF THE PROCEEDINGS AT THE MEETINGS OF THE STATE BOARD OF HEALTH DURING THE YEAR ENDING SEPTEMBER 30, 1876.*

Regular Quarterly Meeting, October 12, 1875.

The Board met in the office of the Secretary of State, the following members being present: Homer O. Hitchcock, M. D., President; R. C. Kedzie, M. D., Rev. C. H. Brigham, Rev. J. S. Goodman, Arthur Hazlewood, M. D., and Henry B. Baker, Secretary.

Arthur Hazlewood, M. D., Committee on Epidemic, Endemic and Contagious Diseases, read a paper upon "Trichinæ."

The paper was accepted and ordered published in the Annual Report. [See Third Annual Report of this Board, pages 26–37.]

R. C. Kedzie, M. D., Committee on Poisons, etc., read a paper upon "The Use of Poisons in Agriculture."

The paper was accepted and ordered published in the Annual Report. [See Third Annual Report, pages 11–25.]

Rev. C. H. Brigham, Committee on Occupations and Recreations, read a paper upon "The Influence of Occupations upon Health."

The paper was accepted and ordered published in the Annual Report. [See Third Annual Report, pages 38–54.]

Some discussion was had relative to the importance of legislation on the subject of escape from public buildings in case of fire. On motion, Dr. Kedzie was requested to prepare a paper on such subject, with the view of so educating public sentiment that legislation will be more easily effected and more effectual. [See pages 14–20 of this Report.]

Rev. Mr. Goodman spoke of the importance of some action for the better protection of the people from poisoning, in consequence of misplaced bottles, improper labeling, etc., in drug stores. On motion, Dr. Hitchcock, chairman of Committee on Legislation in the interests of public health, was requested to prepare a paper upon that subject.

Dr. Kedzie reported the construction of rain gauges, under his supervision; also, that he had prepared and left with the Secretary for distribution a quan-

* Regular meetings occur on the second Tuesday of January, April, July, and October.

tity of Schönbein's test paper for ozone, for the use of meteorological observers for this Board.

The Secretary submitted a report relative to duties which he had been directed to perform, and to some of the regular work of the office since the last meeting. This report accounted for the distribution to local boards of health, to periodicals of the State, etc., of about 1,600 copies of sanitary Rules and Regulations for Local Boards of Health; and of about 1,500 pamphlets on Resuscitation of the Drowned. In accordance with previous direction, 20,000 small pamphlets and 5,000 cards on Treatment of the Drowned had been published. It mentioned the distribution of a package of documents on Resuscitation of the Drowned to each of the Chiefs of police in seventeen principal cities of the State.

It reported progress in securing a corps of regular correspondents to the board, stating that up to that time 46 had accepted the duties incident to that position. It stated that 2,000 blank Meteorological Registers had been printed, and a number sufficient for one year, together with stamped envelopes for return, etc., had been sent to each of the Meteorological Observers for the Board. It also reported, somewhat in detail, progress in the special and general work of the office during the quarter.

Dr. Hitchcock announced that he had received a request for a paper prepared by some member of this Board, to be read at the meeting of the State Teacher's Association to be held at Grand Rapids in December next. Rev. J. S. Goodman was requested to prepare and read such a paper.

A communication from A. A. Day, State Inspector of Illuminating Oils, giving an account of the present status of the system of Oil Inspection in this State, was read.

Dr. Kedzie spoke of the importance of the subject, and of the gratifying fact of its showing some of the good results of the labors of this Board on this subject. He also spoke of having inspected oil brought to him by the State Commissioner of Railroads, and that in consequence of such inspection, oil used on at least one of the roads in this State had, he believed, been ordered to be displaced and that of a safer quality substituted.

The Secretary read a communication from Dr. Elisha Harris, Secretary of the American Public Health Association, asking members of this Board to contribute papers, and to attend the next annual meeting of the Association at Baltimore in December.

A communication was also read from Dr. George E. Ranney, relative to patients treated by him who were apparently suffering from the effects of bad water drank at a neighboring city.

The communication was referred to the local Board of Health of that city.

The following resolutions were adopted:

Resolved, That the thanks of this Board be tendered to the Board of Health of the City of Saginaw, for the prompt and courteous manner in which they have responded to the resolution of this Board asking for an investigation relative to the water-supply of that city.

Resolved, That the hope be expressed by this Board that the Board of Health of the City of Saginaw will continue its efforts until the Common Council shall afford the people of that City an abundant supply of pure and wholesome water.

Communications from J. P. Stoddard, M. D., of Albion, and a second one from J. H. Beech, M. D., of Coldwater, relative to criminal abortion, were read and referred to the committee on legislation in the interests of public health.—[For paper on the subject see pages 53–62 of this Report.]

The Secretary read extracts from letters of prominent physicians throughout the State, in reply to a circular asking them to accept the duties of regular correspondents of this Board. These letters showed a hearty sympathy with, and an earnest desire to aid, the work of the Board in any and all movements for the promotion of the public health and the prevention of unnecessary loss of human life. They showed a degree of unselfish devotion to sanitary reform and enlightenment among the people that is not only remarkable, but extremely creditable to the philanthropy of the prominent members of the medical profession in this State.

Bills were audited—vouchers 149–163 inclusive. The Secretary was authorized to have 25,000 pamphlets on "Treatment of the Drowned" published for distribution to the school population of the State; also to issue circulars to school directors and teachers calling attention to the subject.

Dr. Baker read a brief paper on the "Reproduction of Disease Germs," also one entitled "A Sad Case of Failure to Prevent Deaths believed to have been Preventable." [The papers are published in the Third Annual Report, pages 78–83.]

Rev. J. S. Goodman was asked to make an investigation into the sanitary condition of the common schools in this State; and was authorized to incur expenses not to exceed one hundred dollars.

Dr. Hazlewood was requested to prepare a paper on "The Influence of Vaccination," giving statistics of deaths from small-pox before and since the practice.

Regular Quarterly Meeting, January 11, 1876.

The following members were present: Homer O. Hitchcock, M. D., President, Rev. C. H. Brigham, Rev. J. S. Goodman, Arthur Hazlewood, M. D., and Henry B. Baker, Secretary. Dr. Kedzie was in for a short time, but stated that it would not be possible for him to remain, as he was called elsewhere on business connected with the work of the State Board of Agriculture. At the session in the afternoon, Henry F. Lyster, M. D., also was present.

Rev. J. S. Goodman reported having read a paper on "School Hygiene" at the meeting of the State Teacher's Association, in accordance with the request of the Board.

Rev. J. S. Goodman was authorized to expend the same amount, one hundred dollars, during the year 1876 that was allowed for 1875 but not then expended, in continuing his investigation into the sanitary condition of the common schools.

The Secretary reported a considerable addition to the library of the Board, by purchase of books, reports, etc.

Dr. Hitchcock reported his attendance at the meeting of the American Public Health Association, at Baltimore, in November preceding. That he had sent to each member of the Board the best and most complete reports of the papers read at the various sessions of the meeting, which it was possible for him to secure; that the meeting was well attended, and many of the papers of considerable interest. For the gratification of members present he mentioned that in the report of the Secretary of the Association, on Progress in Sanitary Work, and in other papers and remarks by gentlemen present, the work of the Michigan Board of Health was alluded to in complimentary terms.

In accordance with a recommendation of the President of the Board, it was voted that E. H. Van Deusen, M. D., Medical Superintendent of the State

Asylum at Kalamazoo, be invited to prepare for this Board, a paper on the subject of "Mental Hygiene," or upon some other practical subject germain to the purposes and work of this Board.

A. A. Day, State Inspector of Illuminating Oils for Michigan, came before the Board and read a review of the customs of the trade in oils as connected with his system of inspection, and an explanation of the methods he had adopted, and of his views of the law under which he acted.

The Secretary was directed to have copies of the Reports of the Board properly bound and forwarded to the Centennial Exhibition at Philadelphia.

The Secretary read a report relative to the performance of duties assigned to him, and relative to the regular work of the office during the quarter. The report stated that blanks for an annual report, and for a report of cases of "diseases dangerous to the public health," and printed envelopes for returning the same, had been sent to the Clerks of local boards of health throughout the State, numbering at that time 1,184, and that these reports were being received, filled out, as a rule, in as satisfactory manner as could be expected, so far as related to the duties of the clerk of local boards. It stated that the "Circular Relative to Water-Supply" had been sent to the regular correspondents of the Board, and replies to the same had been received, 25 of which were published in the Annual Report [see Third Annual Report, pages 105–132]. It stated that 25,000 pamphlets on "Resuscitation of the Drowned," and 11,600 Circulars to School Directors and Teachers, had been printed, and would be distributed, in accordance with the resolution of the Board, to the school population of the State. It stated that a Circular asking questions relative to the diseases prevailing during the year 1875 had been planned, printed, and sent to correspondents of the Board, and replies to the same were being received [published in this Report, pages 141–178.] It spoke of the equipment of meteorological observers with rain gauges, ozone test paper, blank registers, etc., and of general progress in the work of the office, and in the printing of the Third Annual Report. The preparing of the illustrations, arranging the manuscript, and reading the proof on the Report, had formed no small part of the work of the office during the quarter.

Communications were read as follows: From the President of the Saginaw City Board of Health, relative to the water supply of that city, stating that the impure water from the works was not longer used, and that the health of the citizens was good; from Howard Daniels, Clerk of the Board of Health for the village of Morley, Mecosta county, suggesting that a law be passed requiring every township to *elect* a competent person as Health Officer; from Edwin Stewart, M. D., of Mendon, bearing upon the communicability of diphtheria; from J. B. Hull, M. D., of Lansing, relative to chorea in the public schools; from Frederick H. Seymour, Statistician of the State Firemen's Association, tendering for the Report of the Board, statistics relating to the causes of fires, etc.; from J. S. Reeves, M. D., of East Tawas, giving some account of the sanitary peculiarities of his locality. Such of these communications as called for action were referred to the appropriate committees.

Considerable discussion was had concerning oil inspection in this State. Several communications relative to the subject were read, and the following resolutions were finally adopted:

Resolved, That this Board is in no way responsible for the manner in which the provisions of the law requiring the inspection of oils have been executed.

Resolved, That the almost entire absence of accidents from the use of danger-

ous oils in this State during the last six months, emphatically justifies the position and efforts of this Board in securing an efficient inspection of oils.

Resolved, That in the opinion of this Board the numerous complaints of bad oil sustaining the flash test of 140° F. now brought into this State, are in no way chargeable to the inspection or the required test, but to the efforts of manufacturers to make an inferior oil, containing paraffine, sustain our test.

Resolved, That a brand of oil free from paraffine, and bearing the Michigan test, should be demanded by all consumers.

The Secretary presented a newspaper account of a decision by the Supreme Court of the State of Louisiana relative to damages for injury from a lamp explosion due to bad oil. It was referred to the committee on legislation in the interests of public health, as was also the whole subject of oil inspection in this State.

Bills were audited—vouchers 164–187 inclusive.

After the transaction of other business, not of such nature as to be important to be here specified, the Board adjourned.

Annual Meeting, April 11, 1876.

The following members were present: Homer O. Hitchcock, M. D., President; R. C. Kedzie, M. D., Rev. Chas. H. Brigham, and Henry B. Baker, Secretary. Rev. J. S. Goodman was present in the afternoon, having been delayed by a train missing connection.

The President's Annual Address, entitled: "Some of the Achievements Actual and Possible of Hygienic Science and Art; their Economic Relations to the State and the Means for their Accomplishment." [See pages 1–14 of this volume.]

So much of the address as related to the appointment of a commission to investigate the influence of alcoholic drinks upon health was referred to the Committee on Legislation in the interests of public health; so much as related to the proposed growth of the *Eucalyptus globulus* and allied species of trees in this State was referred to Rev. C. H. Brigham, Committee on Forest Trees, etc.; so much as related to the subject of vital statistics was referred to Dr. Baker, as a Special Committee.

Dr. Kedzie brought up the subject of oil inspection, and reported many facts and charges going to show that the whole subject again needed thorough investigation. By request of the Chairman of the Committee on Legislation, etc., the subject of the inspection of oil was recalled from that committee, and on motion was referred to Dr. Kedzie, the Committee on Special Sources of Danger to Life, etc., who was authorized to incur such expenses as he may deem proper and necessary in the thorough investigation of the subject. Resolutions on the subject, offered by Dr. Baker, were adopted, but as their purposes have been accomplished, they are not here reproduced.

Rev. J. S. Goodman reported that owing to sickness in his family he had been unable to complete the investigation into the sanitary condition of the common schools.

Rev. J. S. Goodman, for the Committee on Finance, reported that he had examined the accounts of the Board as set forth in the Annual Report of Property, etc., made by the Secretary at the Annual Meeting in April, 1875, and had found the same correct.

Dr. Hitchcock submitted a written report on Criminal Abortion—a subject which had been referred to the Committee on Legislation in the Interests of

Public Health, of which he was Chairman. After considerable discussion the paper was retained by its author in order that advantage might be taken of the points brought out by the discussion.

The Secretary read his Annual Report relative to property purchased, issued, used, on hand, etc., which was as follows:

ANNUAL REPORT OF SECRETARY RELATIVE TO PROPERTY, ETC., APRIL, 1876.

To the President and Members of the Michigan State Board of Health:

GENTLEMEN:—In accordance with the by-laws of this Board, I present to you the following report of property purchased, issued, used, and on hand, for the year ending April 1, 1876. The articles are enumerated in the order in which they are classified on the back of the vouchers, and in the Expense Account of the Board. Property presented to the Board is also enumerated, as it is necessary to do so in order to account for all property issued and on hand.

Instruments and articles of similar nature were accounted for as being on hand, at the time of making the last report, as follows: One standard thermometer, one maximum registering thermometer, one "State Board of Health" oil tester, one spring hand stamp, one letter book dampener, and sixty file boxes. Since that time there have been purchased one standard thermometer, one maximum registering thermometer, one minimum registering thermometer, three psychrometers, one thermometer for a psychrometer, twelve file boxes, and twelve rain guages with accompanying measures. Dr. Kedzie has returned to this office one minimum registering thermometer and one psychrometer, except one thermometer broken in the service of the Board, and replaced by purchase as above mentioned.

Of the above, one standard, one maximum, and one minimum thermometer, one psychrometer and one rain gauge are in the hands of the Hon. Henry F. Thomas, M. D., Allegan, Mich., in accordance with a resolution of this Board passed at its meeting on April 13, 1875 (p. 91, Record Proceedings). One psychrometer has been placed in the hands of Dr. John Bell of Benton Harbor (p. 97, Record of Proceedings, and p. 44, Letter Book, 1875). A rain gauge, with measuring stick, has been placed in the care of each of the following persons: Lyman P. Alden, State Public School, Coldwater; John Bell, M. D., Benton Harbor; E. H. Van Deusen, M. D., State Asylum for Insane, Kalamazoo; Prof. J. Estabrook, State Normal School, Ypsilanti; H. T. Calkins, M. D., Fyfe Lake; J. H. Kellogg, M. D., Battle Creek; J. S. Reeves, M. D., East Tawas; W. C. West, M. D., Monroe; C. M. Woodward, M. D., Tecumseh; and Dr. E. Hause, Tecumseh. One rain gauge was destroyed by fire in the express office at East Tawas January, 1876. All the remaining articles are in the office of the Board.

In my last report, "Sanderson's Microscopic Pathology" was wrongly accounted for as being among the books purchased. It should have read, "Sanderson's Hand Book for Physiological Laboratory." With this exception that report is correct, and for an account of the books which were in the library of the Board at the time of making the last report, I respectfully refer to that report, published on pages xii.–xv. of the Third Annual Report of this Board.

During the year, books have been purchased for the library of the Board as follows:

Beale on Bioplasm.
Miller's Organic Chemistry.
United States Dispensatory.

London Lancet for 1875.
Zeimssen's Cyclopædia of Medicine, Vols. II. and III.
Spencer's Descriptive Sociology, Nos. 1 and 2.
Atlantic Monthly for October, 1875.
Butler on Ventilation of Buildings.
Corfield on Water and Water Supply.
Zehfuss' Pneumatic Sewage System.
Gordon on Sanitation.
Fox on Water Analysis.
Corfield on Sewerage.
Atkinson on Gases in Coal Mines.
Hodgson on Duration of Life.
Walford's Insurance Cyclopædia, Vol. III., Part III.
Page's Geological Examinator.
Fox on The Disposal of Slop Water.
Insurance Register for 1871, British Life Companies.
Meikle on Values of Life Policies.
Tanner on Poisons.
Dempsey on Drainage.
Küss on Physiology.
Miller on Alcohol.
Braun on Curative Effects of Baths.
Frey's Histology.
Beale on the Microscope.
Elkington on Drainage.
Reid on Ventilation.
Quetelet on Probabilities.
Virchow's Cellular Pathology.
Frey on the Microscope.
Weisbach's Mechanics, Vol. 1.
Wood's Therapeutics.
Lewes' Problems of Life and Mind, Vols. 1 and 2.
Baird's Annual Record of Science and Industry, Vols. 1871, 1872 and 1873.
Hinton on Health.
Jones on Annuities, Vols. I. and II.
Latham on Sanitary Engineering.
Rindfliesch on Pathological Histology.
Martin on the Microscope.
Half Hour Recreations in Popular Science.
Walton on Mineral Springs of the United States.
Nicholson on Biology.
Nicholson's Zoölogy, "Text Book."
Nicholson's Zoölogy, "Advanced Text Book."
Page's Economic Geology.
Huxley's Man's Place in Nature.
Lewes' Physiology of Common Life, Vols. I. and II.
Eassie's Healthy Homes.
Fothergill's Maintenance of Health.
Quatrefages on Natural History of Man.
Galton's English Men of Science.
Letheby on Food.

Fox on Ozone.
French on Farm Drainage.
Eassie on Sanitary Dwellings.
Letheby on Sewage Question.
Burn's Practical Ventilation.
Youman and Huxley's Physiology.
Blackwell's Sexes Throughout Nature.
Waring on Draining for Profit and Health.
Duncan's Annuity Tables.
Maudsley on Mental Disease.
Cooke's Fungi.
Krepp on Sewage.
Corbeau on Population.
Mortality Experience of Life Assurance Companies.
Halton's Sanitary Subjects.
Duncan on Fecundity.
Carpenter on the Microscope.
Wilson's Hygiene.
Reese on Analysis of Physiology.
Papillon on Nature and Life.
Croll on Climate and Time.
Nicholson's Manual of Zoölogy.
Vogel's Chemistry of Light and Photography.
Kingsley's Health and Education.
Transactions of the American Public Health Association. Vol. 1.
Dalton's Physiology.

The following periodicals are being received for the year 1876:

Nature, published at London, England.
The Practitioner, published at London, England.
The Sanitary Record, published at London, England.
Public Health, published at London, England.
The London Lancet, published at London, England.
Van Nostrand's Engineering, published at New York.

The following publications have been purchased from Messrs. Eyre and Spottiswoode, printers to the Queen, London, England:

Seventeenth Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Eighteenth Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Twentieth Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Twenty-second Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Twenty-third Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Twenty-fourth Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Thirty-first Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Thirty-second Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Thirty-third Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Thirty-fourth Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Thirty-fifth Annual Report of the Registrar-General, of Births, Deaths, and Marriages in England.

Fifth Report of Royal Commission on Scientific Instruction and the Advancement of Science.

General Report, Capt. Tyler, Accidents on Railways, 1873.

Report of Commissioners of Patents for Inventions, 1873.

Twenty-first Report Science and Art Department of the Committee on Education.

Papers on Vaccination, General Board of Health.

Army Medical Report.

Statistical Abstract, Colonies.
" " United Kingdom.
" " British India.
" " Foreign Countries.

Quarterly Return Births, Marriages, and Deaths, England: Marriages, April, May, June, 1875,—Births and Deaths, July, August, and September, 1875.

Quarterly Return Marriages, Births, and Deaths, England: Marriages, January, February, and March, 1875,—Births and Deaths, April, May, June, 1875.

Quarterly Return of Marriages, Births, and Deaths, England: Marriages for October, November, and December, 1874,—Births and Deaths, January, February and March, 1875.

Tables of Premiums to be Charged Under Contracts for the Insurance of Lives, etc., England.

List of House of Lord Papers for Sale, with price, 1873.
" " " " " " 1874.
" " " " " " 1875.

Reports, Medical Officer of Privy Council, New Series No. I., 1873.
" " " " " " " II.
" " " " " " " III.
" " " " " " " IV., 1874.

Fourth Report Medical Officer of Privy Council, with Appendix, 1861.

Report of Meteorological Committee of the Royal Society for 1873.

Besides the foregoing for the library of the Board, there has been planned and purchased for the use of the office an "Order Book," an "Expense Account Book," a "Property Book," a "Record of Distribution of Documents," two Letter Books, and a scrap book for Circulars, Blanks, and all similar publications of the office.

The above are in good condition, and are in the library of the Board, with the exception of certain ones which have been drawn out for use by members of the Board, as follows:

By Dr. Hitchcock:

"Longevity," by J. Gardener.
Sanitary Subjects, by Halton.
The Insurance Cyclopædia, Vol. III., Part III.
The Practitioner, for February, 1876.
The Sanitary Record, for March 25, 1876.

By Dr. Kedzie:
Trans. Penn. State Medical Society, for 1875.
Water Analysis, by Fox.
Hand Book for Inspectors of Nuisances, by Smith.
Mineral Springs of the U. S., by Walton.
Sanitary Science, by Burns.
Economic Geology, by Page.
Annual Record of Science and Industry, Vols. 1871, 1872, 1873.
Reports of the Detroit Water Commission (set,—18 in all).
Water and Water-Supply, by Corfield.
Sanitary Record, for March 18, 1876.
Public Health, for March 17, 1876.
Sewerage and Sewage Utilization, by Corfield.
Drainage, by Dempsey.
Slop Water of Villages, by Fox.
The Sewage Question, from Letheby.
The Sewage Question, by Krepp.

By Dr. Lyster:
Harts' Manual of Health.
Draining for Profit and Health, by Waring.
Farm Drainage, by French.
Sanitary Arrangements for Dwellings, Eassie.
The Maintenance of Health, by Fothergill.
Sanitary Engineering, by Latham.
Pneumatic Sewage System, by Zehfuss.
Drainage, by Elkington.

By Dr. Hazlewood:
The Sanitary Chemistry of Waters, by C. F. Chandler.
History of a Small-pox Epidemic in Mobile, by Jerome Cochran.
Sanitary Journal (Toronto), for January, 1876.
On Food, by Letheby.
Health and its Conditions, by Hinton.
Curative Effects of Baths and Waters, by Braun.
34th Ann. Rept. Registrar-Gen. of Gt. Britain on Births, Deaths, and Marriages.
4th Report Medical Officer Privy Council, No. XV., 1874.
"Papers on Vaccination," Gen'l Board Health Gt. Britain.
Cincinnati Lancet and Observer, for March, 1876.
24th Ann. Report Fire Commission of Detroit.
Public Health, for Jan. 1, 1876; also for Jan. 22, and Jan. 29.
Canada Lancet, April 1, 1876.

Books and other publications have been presented to the Library of the Board, during the year as follows:

From the Secretary of State, Michigan:
Election Laws of Michigan, Compilation, 1875.
Public Health Laws of Mich., Compilation, 1875.
Railroad Laws of Mich., Compilation, 1875.
Report Board Trustees State Asylum for Insane, 1873–4.
Report Inspectors State Prison, 1874.
Report Board of Control State Reform School, 1874, also for 1875.
Highway, Bridge and Drainage Laws, Mich., 1875.
Township Drain Law, Mich., Compilation, 1875.

Law for solemnization of Marriages, and for collection of Vital Statistics.
Report Board State Auditors, 1875.
Territorial Laws of Mich., Vols. I., II., and III.
Local Acts, Michigan, 1875.
Public Acts, Michigan, 1875.
Joint Documents of Michigan, 1874, Vols. I. and III.
Transactions Michigan Agricultural Society for each of the years 1850, 1851, 1853, 1854, 1858, 1859.
Reports State Board of Agriculture for each of the years 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874.
Reports Michigan Pomological Society for each of the years 1871, 1872, 1873, 1874.
Statistics of Michigan, 1874.

From other persons:

Annual Report Board State Building Commissioners, 1875, from A. L. Bours, Secretary.
Revised Charter of the City of Lansing from ———.
Report Auditor General of Michigan, 1875, from the Auditor General.
Report of Railroad Commissioner of Michigan, 1873, from the Commissioner.
Transactions Michigan State Medical Society, 1875, from Geo. E. Ranney, M. D., Secretary.
Transactions Michigan State Medical Society, 1869, from I. H. Bartholomew, M. D.
Transactions New Hampshire State Medical Society, 1875, from G. P. Conn, M. D., Secretary.
Reports Board of Water Commissioners of Detroit for each of the years 1853–54–55–56–59–60–61–62–64–65–68–69–70–71–72–73–74–75, from Henry Starkey, Secretary.
Report Board of Health, City of Reading, Pa., 1875.
Report Board of Health, City of Philadelphia, 1874.
Report Board of Health, City of Toledo.
Report Board of Health, City of Reading, Pa., 1874, from W. Murray Weidman, M. D.
Report Directors Young Men's Mercantile Library, Cincinnati, 1872, 1873 and 1874.
Report Health Commission, New Jersey, from Ezra M. Hunt, M. D.
First Annual Report Georgia State Board of Health, 1875, from V. H. Taliaferro, M. D., Secretary.
Report Relative to Condition of Public Schools, Philadelphia, 1875, presented by Dr. R. C. Kedzie.

From the Smithsonian Institution, Washington, D. C.:

Directions for Collecting and Preserving Insects.
Circular relating to Collections in Archæology and Ethnology.
Questions relative to the Food Fishes of the United States.
Suggestions relative to scientific investigation in Russian America.
Circular relative to heights.
Directions for constructing Lightning Rods.
Report on Invention of Electro-Magnetic Telegraph.
Directions for Collecting, Preserving and Transporting Specimens of Natural History.
Comparative Vocabulary.
Circular in reference to Degrees of Relationship among Different Nations.

Check List of Publications of the Smithsonian Institution.

From other persons:

Transactions Indiana State Medical Society, 1875, from the Secretary, G. V. Woolen, M. D.

Transactions Pennsylvania State Medical Society, 1875, from Benjamin Lee, M. D., Secretary.

Abstract of Report upon Health Laws and Local Ordinances, from the author, Elisha Harris, M. D., of New York.

A bound volume containing a complete set of the Reports of the Fire Commission of Detroit, 1867–75, from F. H. Seymour, Secretary.

LIST OF PUBLICATIONS RECEIVED FROM THE IMPERIAL STATISTICAL BUREAU, OF THE GERMAN EMPIRE, AT BERLIN.

Statistik des Deutschen Reichs, Band 1. Berlin, 1873. (General and Special Directions for Collection of.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr, 1873. Erstes Heft. (Band II., Heft I. der Statistik des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1873. Zweiter Heft Zweite Abtheilung. (Band II., Heft II., Abtheil. 2, des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1873. Erster Jahrgang, Drittes Heft, Erste Abtheilung. (Band II., Heft III., Abtheil. 1, des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1873. Erster Jahrgang, Drittes Heft, Zweite Abtheilung. (Band II., Heft III., Abtheil. 2, des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1873. Erster Jahrgang, Viertes Heft, ———. (Band II., Heft IV., der Statistik des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1874. Zweiter Jahrgang, Erstes Heft, ———. (Band VIII., Heft I., der Statistik des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1874. Zweiter Jahrgang, Zweites Heft, ———. (Band VIII., Heft II., der Statistik des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1874. Zweiter Jahrgang, Drittes Heft, Erste Abtheilung. (Band VIII., Heft III., Abtheil. 1, der Statistik des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1874. Zweiter Jahrgang, Drittes Heft, Zweite Abtheilung. (Band VIII., Heft III., Abtheil. 2, des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1874. Zweiter Jahrgang, Drittes Heft, Dritte Abtheilung. (Band VIII., Heft III., Abtheil. 3, der Statistik des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1874. Zweiter Jahrgang, Viertes Heft, Zweite Abtheilung. (Band VIII., Heft IV., Abtheil. 2, der Statistik des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1875. Dritter Jahrgang, Erstes Heft, Erste Abtheilung. (Band XIV., Heft I., Abtheil. 1, der Statistik des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1875. Dritter Jahrgang, Erstes Heft, Zweite Abtheilung. (Band XIV., Heft I., Abtheil. 2, der Statistik des Deutschen Reichs.)

Vierteljahrshefte zur Statistik des Deutschen Reichs, für das jahr 1875. Dritter Jahrgang, Zweites Heft, Erste Abtheilung. (Band XIV., Heft II., Abthiel. 1, der Statistik des Deutschen Reichs.)

Zur Berechnung von Sterbetafeln an die Bevölkerungsstatistik zu stellende Anforderungen, [etc.]—K. Becker, Director des Statistischen Amts, des Deutschen Reichs.

Excepting those accounted for as being drawn out by members of the Board, the foregoing publications presented, are in the library and are in good condition.

Of hard paper there was on hand, at the time of making the last report, about ¾ ream Demy, about 2 reams Folio Post, ¼ ream Crown, and ¾ ream Cover paper. Since that time there has been purchased 27 reams Folio Post, 7 reams Crown, 3 reams Demy, 2½ reams Manilla wrapping paper, 2 reams Tea Cover paper and 1 ream Blue Cover paper. There is now on hand 9 reams and 55 sheets Folio Post, about 1 ream Crown, about ¾ ream Demy, 1 ream blue Cover paper, about 1¾ reams Manilla wrapping, and 1 ream Tea Cover paper. This shows that during the year there has been used,—9 reams and 425 sheets of Folio Post, about 6 reams Crown, about 3 reams Demy, about 1¼ reams Manilla wrapping paper, and 1¾ reams Tea Cover paper. This paper has been used for the following purposes: For an edition of 20,000 four-page pamphlets on "Treatment of the Drowned" (July 26, 1875), 4 reams and 80 sheets of Folio Post paper; for an edition of 25,000 of the same (Nov. 8, 1875), 5 reams and 10 sheets Folio Post; for circular [5] soliciting correspondents, 128 sheets Folio Post; for compliment slips ("Compliments of the State Board of Health," etc.) at sundry times during the year, 46 sheets Folio Post; for the manufacture of letter and note paper for the use of the office and members (May 31, 1875, and Jan. 17, 1876) 3 reams and 125 sheets Folio Post; for circular [6] to Clerks of Local Boards of Health, 750 sheets Folio Post; for circular [7] on water supply 125 sheets Folio Post; for circular [8] to Editors, 50 sheets Folio Post; for circulars [9] and [10] to School Directors and Teachers, 2 reams 470 sheets Folio Post; for circular [11] on Prevailing Diseases, 125 sheets Folio Post; for circular [12] to Clerks of Local Boards of Health, 175 sheets Folio Post; for blanks for Special Report of Clerks of Local Boards of Health, 355 sheets Folio Post; and for labels for file boxes, 12 sheets Folio Post. This accounts for all the Folio Post paper used, being 19 reams and 426 sheets. The six reams of Crown were used as follows: For 2,000 Meteorological Registers, 4 reams and 64 sheets; for 1,000 blanks for report of Diseases Dangerous to the Public Health, 2 reams and 40 sheets. The 3 reams Demy were used as follows: For an "Order Book," for the Office of the Secretary of the Board, 60 sheets; for an "Expense Account" Book, 100 sheets: for 5,000 placards on "Treatment of the Drowned" (Aug. 6, 1875) 2 reams and 290 sheets; for a "Record of Distribution of Documents" 87 sheets: for a "Property Book," 100 sheets. This accounts for 3 reams and 58 sheets. The 1¼ ream Manilla wrapping paper has been used for wrapping up reports and documents sent out, excepting 22 sheets which were used for making a scrap book for sample blanks and circulars published by this Board. Of the 1¾ reams of Tea Cover paper, 1 ream 284 sheets were used for making 5,800 wrappers in which to send documents on "Treatment of the Drowned," to the School Directors in Michigan; the remainder was used as wrappers for sending other matter from the office.

Of envelopes there were on hand, at the time of making the last report, 9,559. Since then there has been purchased 15,000, making a total of 24,559. There are now on hand about 11,164. Envelopes have been issued during the year to

Dr. Hitchcock, 500, to Dr. Kedzie, 500, to Dr. Lyster, 500, and to Rev. Mr. Goodman, 500, making the total number issued to members, 2,000. This shows that during the year about 11,395 have been used by this Office. These have been used as follows: For sending "Treatment of the Drowned" to physicians and periodicals in Michigan 2,975 (these were sent prior to the time of making the last report, but were not accounted for as purchased or used because the envelopes were not paid for until after making the report.) For sending blanks for Annual Report to clerks of local boards of health, with envelopes for return, 2,368; for sending blank for Special Report, to clerks of local boards of health, with envelope for return, 2,370; for sending pamphlet "Rules and Regulations" to local boards of health, to periodicals published in this State, to sanitarians and others, about 1,600; for sending meteorological registers to meteorological observers of the Board, with 12 envelopes to each for return, 156. About 1,000 were used in sending Circulars 5, 7, 8, and 11. This accounts for 10,469. The rest, *i. e.* about 926, were used in carrying on the correspondence of the office.

Of letter, foolscap, and note paper there was on hand at the time of making the last report 2,020 sheets and half-sheets. There has since been manufactured, from folio-post paper furnished by this Office, 6,000 sheets and half-sheets note and letter paper, and there has been purchased one ream letter paper. This makes 8,500 sheets to be accounted for. During the year paper has been issued as follows: To Dr. Hitchcock 120 sheets and half-sheets, to Dr. Kedzie 370 sheets and half-sheets, to Dr. Lyster 422 sheets and half-sheets, to Rev. Mr. Goodman 120 sheets and half-sheets, to Dr. Hazlewood 250 sheets and half-sheets; total, 1,282. There is now on hand about 1 ream (480 sheets) letter, ¼ ream (120 sheets) foolscap, and about 4,800 sheets and half-sheets note and letter paper with printed heads. The remainder, about 1,818 sheets and half-sheets, has been used for manuscript, for other work in the office, and in carrying on the correspondence, in doing which 767 pages of letter book were used in copying the most important letters.

At the date of the last report (April 1, 1875), there was on hand $79.12 worth of postage. Vouchers for postage and box rent have been allowed during the year to the amount of $305.14. Total, $384.26. There is now on hand $110.00 worth of postage and vouchers for postage, and $4.13 worth of postal cards,—total, $114.13,—thus showing that during the year the cost of postage has been $270.13. This has been used as follows: For sending out blanks for Annual Report of clerks of local boards, 1,184 two-cent stamps, $23.68; for sending out blanks for Special Report to clerks of local boards of health, 1,185 one-cent stamps, $11.85; for sending pamphlet "Rules and Regulations" to local boards of health and others, 1,524 one-cent stamps, $15.24; for sending 5,681 packages "Treatment Drowned" to School Directors in Michigan, $56.81; for 100 three-cent stamps, issued to Rev. J. S. Goodman, $3.00. Total, $110.58. The remainder has been used in sending out reports and other documents, and in the correspondence of the office, including stamps for return of meteorological registers, replies of correspondents, postal cards for acknowedgment of receipt of documents from this office, and for insufficiently prepaid postage on matter received, etc.

Thus far this report has given the amount of each kind of property received, on hand, and disposed of by this office during the year ending April 1, 1876; but in order to show exactly how much has been expended for all items of property, and for all other purposes, the following statement is here placed. This statement includes vouchers Nos. 124 to 189 inclusive:

AMOUNTS OF EXPENDITURES ALLOWED BY THE STATE BOARD OF HEALTH, AS PER VOUCHERS NUMBERS 124 TO 189, INCLUSIVE. CLASSIFIED AS PER CLASSIFICATION PRINTED UPON BACK OF VOUCHERS.

Chemical Analysis		$10.00
Engraving, Drawing, etc.		192.00
Expenses of Members,	Attending Meetings	129.71
	Other Official	77.55
Instruments and Books		375.34
Paper, Stationery, etc.		306.87
Postage,	Office	305.14
	Members	6.74
Printing and Binding		518.37
Secretary		2,000.00
Special Investigations		-------
Miscellaneous		198.89
Total		$4,120.61

Very respectfully,
HENRY B. BAKER.
Secretary.

The Secretary read a report relative to the work of the office during the quarter. It referred to a report asked of each clerk of a local board of health in the State, covering the time from the close of the fiscal year, Sept. 30, 1875, to the close of the calendar year; to the distribution of about 55,000 documents on Treatment of the Drowned to the school population of the State, a package having been addressed and sent to every school district in the State; to the work in the publication and distribution of the Third Annual Report of the Board; to work on the volume of Vital Statistics being published by the Secretary of State; to the placing of books in the library of the Board; to the correspondence and other work of the office.

A communication from Lyman P. Alden, Superintendent of the State Public School, relative to sickness at that institution, was read and referred to Dr. Hazlewood, with the request that he investigate the cause of the sickness and report to this Board.

Dr. Baker offered the following preamble and resolutions, which were adopted:

WHEREAS, The Signal Service Bureau of the United States has demonstrated its great usefulness in securing benefits to public safety of life in this State, particularly to the large number of persons employed upon or journeying over the great lakes, and in promoting health through better protection of cereal and other food crops because of its warnings, and also through the valuable data for the study of the relations of health and of diseases to the climatic conditions, knowledge of which is essential to an avoidance of causes now statistically shown to be of great influence on the death rate; therefore,

Resolved, That the hope be expressed by this Board that the means ot usefulness of the U. S. Signal Service Bureau be in no way abridged, but rather increased; that it be permanently organized, and that its sphere of labor be enlarged, especially in the direction of obtaining and recording meteorological data bearing still more closely upon important questions relating to the public health.

Resolved, That, although not essential in connection with its work for the prediction of storms, it is desirable for purposes of progress in public health that we have at least monthly statements of the absolute humidity of the atmosphere, and of the exact atmospheric pressure at different stations (not calculated to sea level as required

for other purposes), and that it is also desirable that observations on Ozone be recorded.

Resolved, That in the opinion of this Board, such an enlargement of the means and labor of the Signal Service as is contemplated in the foregoing, will add to its present acknowledged usefulness, and is desirable in the interests of public health in this State.

Resolved, That the Secretary of this Board be directed to forward a copy of the foregoing preamble and resolutions to the Chief Signal Officer of the United States, and to each of the members of Congress from this State.

Dr. Baker offered the following:

In order to obtain and place before the people, facts relative to the spread of scarlet fever, more particularly in this State, and the mortality resulting therefrom among the inhabitants of Michigan, I move that Dr. Hazlewood,—Committee on Epidemic Diseases, etc., be requested to plan a circular asking for reports of cases and all information bearing upon the dissemination and restriction of this disease, and that, when planned, the Secretary be directed to submit a copy of the proposed circular to each member in the manner heretofore adopted, with the view of making the circular as near perfect as possible, and that, when the circular has been perfected and approved by a majority of the members of the Board, it be printed and sent, together with stamped envelopes and a request for replies, to the correspondents of the Board.

The motion prevailed.

Dr. Baker also offered the following preamble and motion:

While recognising the truth of the proposition, that our knowledge of the prevention of scarlet fever may in the future be greatly advanced, I believe it is important to state clearly what now seems established as proper and desirable to be done.

Considering the fact that hundreds of deaths from this disease occur in this State in every year, a large proportion of which it is believed might by proper measures be prevented, it seems proper to place before the people immediately those methods for its restriction which have already been made to appear important.

I therefore move that Dr. Hazlewood, Committee on Epidemic Diseases, etc., be requested to prepare a set of instructions on this subject which shall aim to do for the prevention of scarlet fever, what has been done by this Board for the prevention of deaths from drowning,—that is, place before the people in a condensed and easily understood form, the best methods of procedure for this purpose; that when his plan has been matured, the Secretary be directed to have copies sent to each member of the Board for examination and suggestions, and that Dr. Hazlewood be asked to present it in an amended form at the next meeting of the Board, to the end that when finally approved by a majority of the members of the Board, a large number of copies be printed for distribution to local boards of health, to correspondents and others, more especially to physicians in practice in this State.

The motion prevailed.

Communications, from C. H. Bostwick, Weesaw, Berrien Co., relative to typhoid fever; from J. T. Elliott, of Grand Rapids, relative to school recesses; from A. Nash, M. D., Lapeer, relative to analyses of water in certain cases; from Lee S. Cobb, Nirvana, offering meteorological observations, and from others, were read and referred to appropriate committees, or were otherwise disposed of.

Dr. Baker presented a communication relative to the "Rules and Regulations" published by this Board, relating more particularly to those concerning vaccination. His communication contained extracts from the *Sanitary Record* of London, England, for Jan. 15 and March 4, 1876, reviewing and highly commending the "Rules" as a whole and in detail, except the one—Rule 14—which says: "Every child should be vaccinated before two years of age," etc. The editor of the English periodical much preferred the requirement in that country, namely, that every child must be vaccinated before it is three months old.

The above mentioned communication was referred to Dr. Hazlewood, Committee on Epidemic, Endemic, and Contagious Diseases.

Rev. C. H. Brigham presented some suggestions relative to "steam heaters," which were referred to Dr. Kedzie, Committee on Ventilation, etc.; also relative to "sensational literature," which was referred back to himself as Committee on Recreations, etc.

Rev. J. S. Goodman mentioned that at a school convention at Grand Rapids, he had called attention to the documents issued by this Board giving rules for the "Resuscitation of the Drowned and Suffocated." In this connection the Secretary remarked that the fact was sometimes overlooked that brief but plain directions for attempts at resuscitation of persons apparently dead from chloroform are given near the close of the document just mentioned.

The replies of correspondents relative to prevailing diseases were referred to the Secretary with authority to publish them in the Annual Report. [See pages 141–178 of this volume.]

Bills were audited—vouchers 188–202 inclusive.

Dr. Kedzie was asked to attend, for this Board, the meeting of the American Medical Association, in June, 1876.

The Secretary mentioned, as matters of interest, that the Legislature of Wisconsin had passed a law establishing a State Board of Health, that favorable amendments had been made in the law establishing the Georgia State Board of Health, and that a sum amounting to about $4,000 annually had been appropriated for the establishment of a Supreme Board of Health for the German Empire.

Mention was made of the death of Thomas M. Logan, M. D., Secretary of the State Board of Health of California, and ex-President of the American Medical Association; of the death of Edmund A. Parkes, M. D., F. R. S., author of "Parkes' Hygiene," and of the death of Henry Letheby, an eminent English chemist and sanitarian.

The by-laws were so amended that the Secretary's report of "Property," etc., shall be made at the October meeting, and for the fiscal year.

Regular Quarterly Meeting, July 11, 1876.

The following members were present:

Homer O. Hitchcock, M. D., President, R. C. Kedzie, M. D., Rev. John S. Goodman, and Henry B. Baker, Secretary. At the afternoon session, Dr. Arthur Hazlewood also was present.

Mr. F. W. Averill was present and read a statement, and replied to questions by members of the Board, relative to the subject of oil inspection in Michigan.

Dr. Kedzie then presented his report upon oil inspection in Michigan. A communication from A. A. Day, State Inspector of Illuminating Oil, was read and placed on file.

The subject of oil inspection was discussed at length, and action inaugurated for advancing the interests of public safety in connection therewith in this State.

Dr. Kedzie, Committee on Public Buildings, etc., read a paper on "Means of Escaping from Public Buildings in case of Fire."

The paper was accepted and ordered published in the Annual Report. [See pages 15–20 of this volume.]

Dr. Kedzie also read a paper on the "Ventilation of Railroad Cars."

The paper was ordered published in the Annual Report [see pages 131–140 of this volume], and the Secretary was directed to procure proper illustrations for the same.

Dr. Kedzie exhibited a sample of water received from the State Public School at Coldwater, which had been subjected to Heisch's Test—ten grains of crystallized sugar to a pint of water and exposure to light—and which showed the presence of fungoid or bacterial growth.

Dr. Baker, Committee on Death-Rate, etc., exhibited tables and diagrams illustrating the Death-Rate in the different States and Territories, being part of an article in preparation on the Death-Rate as influenced by Age, Climate and Social Condition.

Dr. Hazlewood, Committee on Epidemic Diseases, etc., read a paper on "Vaccination."

The paper was accepted and ordered published in the Annual Report. [See pages 21–40 of this volume.]

Rev. S. Day, of Ann Arbor, requested to lay before the Board plans for a filter designed for filtering water before storage in cisterns. He described his plans, and exhibited a diagram of a cistern with the filter attached.

Dr. Kedzie read a report of his attendance at the last meeting of the American Medical Association, giving an account of some of the proceedings.

The following resolution was adopted:

Resolved, That all papers for the Annual Report for 1876 shall be placed in the hands of the Secretary on or before the day of the quarterly meeting in October.

Resolved, That the Secretary be requested to proceed with the publication of our Annual Report so that it shall be issued by the first of January, 1877.

The Secretary read a report of work in the office during the quarter. It mentioned the distribution of documents and of the Third Annual Reports, stating that about 1,200 copies of the Report had been sent to sanitarians, periodicals, civil officers, etc., mostly in Michigan, and arrangements were made for sending the Reports to 1,547 presidents and clerks of local boards of health in the State. It mentioned the receipt of numerous letters and acknowledgments of the last Report by prominent citizens of this State, and by prominent sanitarians in other States, containing expressions of approval and satisfaction with the work of the Board, many of them being exceedingly complimentary. A few, serving to illustrate the status of the Board in the minds of the people, were submitted. It mentioned the frequent application from persons in other States and Territories for publications of this Board, particularly for such as will aid them in securing a general board of health in their own States. It mentioned the fact that the Secretary had made a sanitary examination of the State Public School at Coldwater, by request of the secretary and treasurer of its Board of Control, and that he had carefully written out a report, with such suggestions as he deemed important, and had forwarded the same to the Board of Control of said State School.

Dr. Baker presented a plan for the registration and report of prevailing diseases. It contemplated asking leading physicians throughout the State, and the health officers of all cities in Michigan, to report the diseases prevailing during stated periods of time, on postal card blanks furnished by the Board. The plan was adopted, and the Secretary authorized to proceed with the project.

A communication from J. T. Elliott of Grand Rapids, relative to the supposed unhealthful influence of decaying sidewalks, was read and referred to the committee on disposal of decomposing organic matter.

Two communications were read from Lyman P. Alden, Supt. State Public School, one about a boy taken with scarlet fever soon after admission to the school, and the other giving an account of the unusual sickness at the State

Public School, and stating the dimensions of some of the rooms at that institution, both of which were referred to Dr. Hazlewood,—Committee on Epidemic Diseases, etc.

A communication from the United States Centennial Sanitary Commission to Dr. H. O. Hitchcock, President of the Board, notifying him of his election as a member of that body, and the reply to the same by Dr. Hitchcock, were presented and filed.

The Secretary announced that a set of the Reports of the Board, bound for the Centennial Exhibition, had been forwarded to the Secretary of the Michigan Centennial Commission.

Dr. Hitchcock was asked to attend for this Board the International Medical Congress at Philadelphia, September 4–9, and Dr. Baker was asked to attend the American Social Science Association at Saratoga, September 8, 1876.

Bills were audited,—vouchers 203–218 inclusive.

The Secretary read a communication from O. Marshall, M. D., of North Lansing, on an Epidemic of Scarlet Fever in his locality. It was accepted for publication in the Annual Report, and the Secretary was directed to make the necessary provision therefor. [See pages 41–52 of this volume.]

A communication from J. M. Loop, M. D., of Port Sanilac, relative to an outbreak of typhoid fever in that locality, was read and referred to the Secretary with authority to publish it. [Published in this volume. See Index.]

A communication from Dr. John Bell, of Benton Harbor, relative to diseases prevalent in Berrien County during 1875, being a report made to the Berrien County Medical Society by Dr. Stratton, was read and referred to the Secretary for publication if found suited to the report. [See, in Reports of Prevailing Diseases, pages 171–174 of this volume.]

After the transaction of other business relative to regular correspondents, etc., the Board adjourned.

REPORT OF SECRETARY RELATIVE TO PROPERTY, ETC., FOR THE LAST HALF OF THE FISCAL YEAR ENDING SEPT. 30, 1876.

In accordance with an amendment to the by-laws of the Board providing for the Secretary's Report of Property, etc., at the October, instead of at the April meeting, the following report, covering the time from April 1, to September 30, 1876, was made at the meeting of the Board, October 10, 1876. Being for the last six months of the fiscal year for which this report is made, it properly belongs in this report. It was as follows:

To the President and Members of the Michigan State Board of Health,

GENTLEMEN:—In compliance with Section 5 of Article II. of the by-laws of this Board, the following report of the "nature and amount of property belonging to the Board, which has been received, issued, expended, and destroyed since the last report, and of the property remaining on hand, and also in whose care each item of property is entrusted," is respectfully submitted. At the meeting of this Board on April 11, 1876, the section referred to was so amended that thereafter the report should be made at the October instead of at the April meeting. It is therefore now presented, and is made to cover the period between April 1, 1876, and September 30, 1876, being the last half of the fiscal year.

For an account of the instruments and articles of similar nature which were on hand at the time of making the last report, you are respectfully referred to that report. Since that time six rain-gauges and accompanying measuring sticks have been purchased. Four of these are in the office, and the other two

have been placed in the hands of Lee S. Cobb, Nirvana, Lake county, and W. H. Martin, M. D., Belleville, Michigan, meteorological observers for this Board. One rain-gauge has been returned from C. M. Woodward, M. D., Tecumseh, and is now in the office of the Secretary.

The books that were on hand at the time of making the last report are enumerated in detail in that report.

Books and other publications have been received during the half year since as follows:

By Purchase:—

Simon on Filth Diseases and their Prevention.

Monson on Separate system of Drainage.

Schutzenberger on Fermentation.

By Gift:—

From Dr. Henry B. Baker,

Dr. Lankester's Sanitary Instructions, viz:—

1. Rules for the Management of Infants and the Preservation of Health.

2. Scarlet Fever and Means for Preventing it, and Infectious or catching Diseases.

3. Typhoid or Drain Fever and its Prevention.

4. Small-Pox and its Prevention, and Vaccination and Vaccination Laws.

5. Cholera and Diarrhea and their Prevention.

6. Measles and its Prevention.

Summary of Work of Mass. State B'd of Health. From the Board.

Rep't Auditor Gen. of Mich. 1875. From Auditor General.

Mortuary Statistics, N. Y. Mutual Life Ins. Co. From Dr. G. S. Winston.

Fourth Ann. Rept. B'd Health City of Hamilton, Ohio. From M. C. McMaken, Secretary.

Fourth Ann. Rept. State B'd. Health Minn. From C. N. Hewitt, M. D., Secretary.

Ann. Rept. Chelsea, Mass., City Government, 1875. From Thomas Green, Mayor.

Seventh Ann. Rept. Mass. State B'd Health. From Mass. State B'd Health.

Ann. Journ. Mich. State Eclectic Association, 1875. From the Society.

Baxter's Medical Statistics U. S. Provost-Marshal Gen's Bureau, Vol. I. From Geo. H. Durand, M. C.

Baxter's Medical Statistics U. S. Provost-Marshal Gen's. Bureau, Vol. II. From Geo. H. Durand, M. C.

Trans. Wis. State Med. Society for 1869, 1870, 1871, 1872, 1873, 1874, 1875. From J. T. Reeve, M. D.

Insane, Deaf, Dumb, Blind, Ann. Statistical Report Mich., 1875. From Sec'y of State.

From Henry R. Stiles, M. D., as follows:—

Hygiene and Architecture, by Carl Pfeiffer.

Effects of High Temperature upon the Public Health, Stephen Smith, M. D.

Rules of Health Department of N. Y. City, 1873.

Tenement House Population of N. Y. City, by Stephen Smith, M. D.

Condensed Statement of the Requirements of the B'd of Health of N. Y. City, 1871.

Constitution of the Public Health Association of N. Y. City, 1872.

From H. R. Stiles, Superintendent State Asylum for Insane, as follows:

Rules for Employes State Asylum for Insane, Middletown, N. Y.

Fourth Ann. Rep's. State Asylum for Insane, Middletown, N. Y.

By-laws State Asylum for Insane, Middletown, N. Y.

Rep't. of Com. on Legislation Am. Inst. of Homeopathy, June 15, 1875.

" " " " Homeopathic Med. Society, Feb. 9, 1875.

Ann. Rep'ts City Officers, City of Paterson, N. J., for the year ending March 20, 1876. From Samuel R. Dean, Registrar.

Ann. Rep't B'd of Health, City of Pittsburgh, 1875, from ————.

Ann. Rep'ts, etc., City of Bangor, Maine, 1875–6, from H. Gale.

Ann. Rep't B'd of Health, City of Chicago, 1874–5, from ———.

Rep't Com. on State B'd of Health, Med. Soc. of Tenn., E. M. Wight, M. D.

From Emmons Clark, Secretary N. Y. City B'd of Health, as follows:

Second and Third Ann. Rep'ts Metropolitan B'd of Health 1867 and 1868.

First, Second, Third and Fourth Ann. Rep't B'd of Health Department N. Y. City, 1870, 1871, 1872 and 1873.

From this Board:

3 vols. 1st Ann. Rep't Mich. State B'd of Health, 1873.

2 " 2d " " " " " " " 1874.

3 " 3d " " " " " " " 1875.

From the Secretary of the Massachusetts Board of Health:

1st, 2d, 3d, 4th, 5th and 6th Ann. Rep't Mass. State B'd of Health, 1870, 1871, 1872, 1873, 1874, and 1875.

Rep't B'd of Health Toledo, Ohio, 1875, from ———.

Equal Allopathic and Homeopathic Recognition and Representation, from Henry R. Stiles, M. D.

Transactions of the Tenn. Med. Society, 1875, from J. D. Plunket, M. D., Secretary.

Rep't B'd of Health, Nashville, Tenn., 1875, from J. Berrien Lindsley.

Rep't Registrar-Gen'l, Scotland, 1875, from Registrar-Gen'l, Scotland.

Gastrotomy and Gastrostomy, from J. H. Pooley, M. D.

Manual of the Common Council, Detroit, from C. H. Borgman, City Clerk.

Rep'ts Conn. B'd of Agriculture for the years 1866, 1867, 1868, 1871, 1873, 1874 and 1875, from T. S. Gold, Secretary of the Board.

Geological Survey of Ohio, Paleontology, Vol. II., from Edward Orton, President Ohio Agric'l College.

Catalogue City Library, Mayor's Office, Providence, R. I., from the Mayor.

Ohio Med. Society, 1875, from S. S. Gray, M. D. Librarian and Treasurer.

Trans. N. Y. State Agricultural Society for the years 1863, 1864, 1865, 1866, 1867 Vols. I. and II., 1869, 1870 and 1871, from T. L. Harrison, Cor. Sec'y.

Trans. Med. and Chirurgical Faculty of Md., 1874, 1875 and 1876, from Dr. W. G. Register, Secretary.

Trans. Kentucky State Med. Society, 1876, from James H. Letcher, M. D.

Rules of Practice in U. S. Patent Office, from Com. of Patents.

Mich. Board of Agriculture, 1875, from Secretary of State.

Trans. of the Mich. State Med. Society, 1876, from G. E. Ranney, M. D., Secretary.

Common Council and the B'd of Health, City of Newburgh, N. Y., from —.

From Surgeon General U. S. Army, as follows:

Medical Statistics of U. S. Army, 2 vols. 1839–55, 1855–59.

Barracks and Hospitals. Circular No. 4.

Hygiene of the U. S. Army. Circular No. 8.

From Dr. F. Hoffman:

The Popular Health Almanac, 1876.

From C. T. Wilbur, M. D., Supt., as follows:

Reports of the Directors of School, at Jacksonville, Ill., for Feeble-minded Children, for the years 1866, 1867, 1868, 1869, 1871, 1872, 1873, and 1874.

Chorea, its Cause and Treatment, from Geo. T. Stevens, M. D.

Rep't Health Officer of Oakland, Cal., 1875, J. B. Trembley, M. D.

From S. L. Boardman, Secretary, as follows:

Ann. Reports of the Maine State B'd of Agriculture for the years 1872, 1873, 1874, 1875, and 1876 with General Index.

From Statistical Bureau German Empire, as follows:

Statistik des Deutchen Reichs, Band XIV., Heft II. Abth. 1 and 2, Heft III. Abth. 1, 2, 3 and 4.

From Francis E. Englehardt, Ph. D., as follows:

Ann. Reports of the Superintendent of Onondaga Salt Springs, for the years 1870, 1871, 1872, 1873, 1874, 1875, and 1876.

Ann. Rep't B'd of Health of Baltimore, Md., from James H. Stewart, M. D.

Of hard paper there was on hand at the time of making the last report, 9 reams and 55 sheets of Folio Post, about one ream Crown, about ¾ ream Demy, 1 ream Blue Cover paper, about 1¾ reams Manilla wrapping paper, and 1 ream Tea Cover paper. Since that time there has been purchased 1 ream Manilla wrapping paper. There is now on hand about 8 reams and 120 sheets Folio Post, about one ream Crown, about ⅝ ream Demy, about 450 sheets Blue Cover paper, about 1¼ reams Manilla wrapping paper, and about ¾ ream Tea Cover paper. This shows that during the half-year about 415 sheets of Folio Post, about 30 sheets of Blue Cover paper, about 1½ reams Manilla wrapping paper, about ¼ ream Tea Cover paper, and about 1-12 ream Demy paper have been used. This has been for purposes as follows: 20 sheets of Folio Post have been used to make labels for library books, 225 sheets for blanks for record of prevailing diseases, 65 sheets for Circular No. 13, and 70 sheets for slips for receipts for documents from this office. Twenty-five sheets of Demy have been used for printing resolutions passed by this Board. Twenty-five sheets of Blue Cover paper have been used for covers for blank record of prevailing diseases. The 1½ reams of Manilla wrapping paper have been used in wrapping up reports, public health laws, and other documents sent out by mail or express. The ¼ ream of Tea Cover paper has been used in wrapping up newspapers, reports, and other documents sent out.

Of envelopes there were on hand at the time of making the last report about 11,164. Three thousand have since been purchased; making a total of 14,164. There are now on hand about 12,350; thus showing that during the half-year about 1,814 have been used. Of these, about 450 have been used in sending Circular No. 13, with blanks for return of prevailing diseases, to Correspondents and Health Officers of Cities; about 100 have been sent, stamped, to Correspondents and meteorological observers; about 75 have been used in sending a circular letter to County Clerks, and the remainder, about 1,000, have been used in the ordinary correspondence of the office.

Of letter, foolscap and note paper, there was on hand at the time of making the last report about 480 sheets plain letter, 120 sheets foolscap, and 4,800 sheets and half-sheets note and letter paper with printed heads. Since the last report, paper has been issued as follows: To Dr. Kedzie 300 sheets and half-sheets; to Dr. Hazlewood 100 sheets. There is now on hand about 80 sheets

plain letter, 50 sheets foolscap, 3,400 sheets and half-sheets note and letter paper with printed heads. The remainder, about 1,470 sheets and half-sheets, has been used for manuscript and other work in the office, and in carrying on the correspondence. In copying the important letters sent out, 526 pages of the Letter Book have been used.

At the date of the last report (April 1, 1876) there was on hand $114.13 worth of postage and vouchers for postage. Since that time vouchers for postage and box rent have been allowed to the amount of $177.55, making a total of $291.68. There is now on hand $11.84 worth of postage, thus showing that since the last report, April 1, 1876, the cost of postage has been $279.84. This has been used as follows: For sending out 450 copies of the Public Health Laws, 450 three cent stamps,, $13.50; for sending out copies of the third Annual Report of this Board, $154.14; for 1,500 postal cards printed and sent out to correspondents and health officers for the reports of prevailing diseases $15.00; for sending notices to officers of local boards of health to call on county clerks for copy of the third Annual Report, 1,450 postal cards were printed and sent out, $14.50; 800 postal cards for acknowledging receipts, from this office, $8.00; 500 postal cards for acknowledging receipts by this office, $5.00; total, $210.14. The remainder has been used in the regular correspondence of the office except that used for stamps for return of meteorological registers, stamped envelopes to correspondents, etc.

This report has thus far given, in most instances with exactness, in a few approximately, the *amount* of each kind of property received, on hand, and disposed of by this office during the half year ending September 30, 1876; but in order to show exactly how much has been expended for all items of property and for all other purposes during the time specified, the following statement is here placed. This statement includes vouchers numbers 190 to 218 inclusive.

AMOUNT OF EXPENDITURES BY THE STATE BOARD OF HEALTH, AS PER VOUCHERS NUMBERS 190 TO 218 INCLUSIVE. CLASSIFIED AS PER CLASSIFICATION PRINTED ON BACK OF VOUCHERS.

Chemical Analyses		$10.00
Engraving, Drawing, etc.		125.00
Expenses of Members,	Attending Meetings	52.75
	Other Official	58.05
Instruments and Books		14.90
Paper, Stationery, Etc.		12.90
Postage,	Office	177.55
	Members	4.00
Printing and Binding		46.45
Secretary		1,000.00
Special Investigations		-------
Miscellaneous,	Express	29.45
	Otherwise	20.17
Total		$1,551.22

Very respectfully,

HENRY B. BAKER,
Secretary.

EXPENDITURES DURING THE FISCAL YEAR.

The total amount drawn from the State Treasury on account of the State Board of Health during the fiscal year ending September 30, 1876, under the act establishing the Board, as shown by the books of the Auditor General's office, was $4,096.27.* This is stated, not because it shows any thing in particular, except that the actual expenditures during the fiscal year closely approximated those for the calendar year, but it is stated because such a statement *seems* to be called for. In reality, however, the appropriation is understood to be for the calendar year, and the expenditures for each calendar year are limited to, and do not and cannot exceed, four thousand dollars.

In the books of this office the expenses of the Board are classified under twelve different heads. The amounts allowed by the Board, under each of these heads, during the fiscal year (not the calendar year) were as follows:

Chemical Analyses	$10.00
Engraving, drawing, etc	192.00
Expenses of members, Attending meetings	121.71
Expenses of members, Other official	135.60
Instruments and books	334.39
Paper, stationery, etc.	280.70
Postage, Office	332.69
Postage, Members	9.99
Printing and binding	525.92
Secretary	2,000.00
Special investigations	-------
Miscellaneous	78.27
Total	$4,021.27

The foregoing was used under the act of the Legislature establishing the Board. Under an act of the Legislature approved April 30, 1875, providing for the payment of salaries of State officers, and clerks in the several State offices, $1,688.58 was expended for clerk hire in the office of the Board.

CIRCULARS, BLANKS, ETC., ISSUED BY THE BOARD.

CIRCULAR TO CORRESPONDENTS RELATIVE TO WATER-SUPPLY.

One of the first circulars issued during the year, for which this Report is made, was the one relative to Water Supply, sent to the regular correspondents of the Board. Some replies to it were received in time to be published in last Report, pages 105–132, and the circular was also inserted in pages 108–110, in order to save repeating the questions. As the circular is again published, for the same purpose, on pages 84–85 of this volume, it is not printed in this part of the report. Additional replies to the circular have been received, and those received before that part of the volume was printed are published in this Report, on pages 85–105.

CIRCULAR ASKING COÖPERATION OF EDITORS IN MICHIGAN.

In order to disseminate a knowledge of some of the plans of work of the Board, and thereby render more probable and valuable the coöperation of all

*Includes one voucher for $75 allowed by the Board in July of the previous fiscal year.

intelligent citizens, circular No. [8], to editors, and certain other documents mentioned therein, were sent to each editor in Michigan. The circular was as follows:

[8.] OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH,
Lansing, Michigan, October, 1875.

To the Editor:

DEAR SIR:—The accompanying circular, relative to water-supply, is this day issued to the correspondents of this Board with the two-fold purpose of collecting all the information now possible, and at the same time furnishing a memorandum of some of the relations of this subject to the public health, which it is hoped will be more closely studied by all to whose notice the questions are brought. A copy is sent to each editor in Michigan, as an item of possible interest, and for the reason that, as this Board is working in the interests of public health, it expects the continued co-operation of the public press.

Some of the directions in which this Board labors have been indicated by documents previously sent to you. A blank, such as is furnished to the meteorological observers for this Board, is enclosed herewith. Meteorological conditions are known to have a large share in controlling the death-rate, particularly from certain diseases. It is hoped that much more specific knowledge of the causation of disease and death may be gained by combining with the records of diseases, and with the mortality statistics now collected, more accurate meteorological data, than have heretofore been accessible. The usual blanks for Annual Reports from local Boards of Health, and the circular of instructions to clerks of such boards, have lately been prepared. These are sent to the clerk of every township, city and village board of health in Michigan.

This opportunity is taken to suggest, that if at any time you publish interesting matter relating to the public health, you will confer a favor, and perhaps promote the welfare of the people, by sending a copy thereof to the library of this Board, at Lansing.

By direction of the State Board of Health.

Very Respectfully,

HENRY B. BAKER,
Secretary.

CIRCULARS TO SCHOOL DIRECTORS AND TEACHERS, TRANSMITTING DOCUMENTS ON "TREATMENT OF THE DROWNED."

In December, 1875, circulars [9] and [10] to school directors and teachers were printed, and during the winter and spring of 1876 they were sent to each school district in the State, except possibly in a few cities where the documents on "Treatment of the Drowned" had previously been quite freely distributed. Each of these circulars was accompanied with a few small pamphlets, and one or two printed cards containing the rules recommended by this Board for the resuscitation of the drowned and suffocated. In this manner were distributed about thirty-six thousand copies of the small pamphlets and about six thousand of the larger cards. These were sent in a little less than six thousand separate packages addressed to the school directors in the several townships, cities and villages in Michigan. For a list of the names and postoffice addresses of these officers, our thanks are due to the office of the Superintendent of Public Instruction. The circular to school teachers was so similar to the one to the directors that it is not necessary to publish it here. The circular to school directors was as follows:

[9.] OFFICE OF THE STATE BOARD OF HEALTH,
Lansing, Mich., Dec., 1875.

To the School Director:

DEAR SIR:—Herewith are sent to you a few small pamphlets, and one or two printed cards, on "Treatment of the Drowned."

A large proportion of the deaths from drowning occur among persons in early life, and it is believed that in many cases boys are near by when deaths from drowning occur, especially among their fellows.

If these directions for resuscitating the drowned can be taught to the school population of this State, numbering now about five hundred thousand, it cannot be doubted that in every year many valuable lives will be saved that otherwise will be lost.

With this object in view, will you have the kindness to see that the best possible use is made of the limited number of these documents which I am able to send you? The card will probably best subserve its purpose if conspicuously posted in the school house. It seems desirable that each teacher have one of the pamphlets, and, after studying it thoroughly, that he impart to the scholars, in the way which seems to him best, a complete knowledge of its contents, particularly the principles involved in artificial respiration, upon which the resuscitation mainly depends. Every one of these documents should be judiciously used among those likely to learn and profit by the method, as for instance, the largest or most intelligent boys in the school. If sufficient care and judgment be used it will be well if such persons become familiar with the practice of this method of artificial respiration, upon each other. The method is applicable in other life-saving efforts besides those in cases of drowning, as, for instance, in some cases of poisoning, where the poison will pass out of the body if life can be maintained long enough. In such cases artificial respiration may save life when no other measure will. In this matter we trust that we shall receive your hearty coöperation, to the end that the children in this State may be taught this means of saving life, and that the number of lives now constantly being lost, through lack of knowledge and proper effort, may in the future be greatly lessened.

By direction of the State Board of Health.

Very respectfully,

HENRY B. BAKER, M. D.,
Secretary.

Please give the enclosed circular to the teacher in your district.

CIRCULAR TO CORRESPONDENTS, RELATIVE TO PREVAILING DISEASES IN MICHIGAN, 1875.

In the latter part of the year 1875, a circular was issued to correspondents asking statements, for the locality of each, concerning the diseases of men, animals, and crops used as food by man and domestic animals, during the year 1875. Replies were received from prominent physicians in various parts of the State. They are published in this Report, on pages 153–178. A general summary for the State may be found on pages 141–152. As the circular is printed on pages 152–153, it is, therefore, unnecessary to print it in this connection.

CIRCULAR TO CLERKS OF LOCAL BOARDS OF HEALTH, TRANSMITTING BLANK FOR REPORT FOR QUARTER ENDING DECEMBER 31, 1875.

The circular on this subject explains itself. It was issued directly after the close of the year 1875, and was as follows:

[12.] OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH,
Lansing, Michigan, January, 1876.

To the Clerk of the Local Board of Health:

SIR:—A large proportion of the reports from clerks of local boards of health do not reach this office in time to allow of the proper compilation of the data contained

therein in time for publication in the Report of this Board for the same fiscal year. This being so, it becomes desirable to have returns for the calendar year, and there is no longer any good reason why they should be made for the fiscal year.

In order to bring the returns up to the beginning of the year 1876, it will be necessary for the Clerks of local boards of health to make a report for the period from Sept. 30, 1875, to Jan. 1, 1876. I therefore send you herewith a blank [Form C.] for such report.

When your report reaches this office, if properly made, it will be possible to learn from it the exact number of cases of diseases on your record, that have not been returned to this office, when a sufficient number of blanks for report of such cases can be sent to you, or we can leave them to be reported in detail with your next Annual Report.

On the blank sent herewith, please make out a report for the period beginning October 1, and ending December 31, 1875, and return the same to this office as soon as possible, in accordance with Section 8 of Act No. 81, Laws of Michigan, 1873.*

By direction of the State Board of Health.

Very Respectfully,

HENRY B. BAKER,

Secretary.

*Laws of 1873, Act No. 81, "Sec. 8. It shall be the duty of the health physician, and also of the clerk of the local board of health in each township, city, and village in this State, at least once in each year, to report to the State Board of Health their proceedings, and such other facts required, on blanks and in accordance with instructions received from said State Board. They shall also make special reports whenever required to do so by the State Board of Health."

BLANK FOR REPORT FOR QUARTER ENDING DECEMBER 31, 1875.

The blank, Form [C.], mentioned in the foregoing circular as accompanying it, was as follows:

[Before filling any blanks, please read carefully through the entire form, including foot-notes and instructions.]

[C.]

SPECIAL REPORT TO THE STATE BOARD OF HEALTH, by the Clerk of the Board of Health for the *——— of ———, County of ———, State of Michigan, for the quarter ending December 31, 1875.

To the Secretary of the State Board of Health:

SIR:—Compared with the same season in previous years, the proportion of deaths to inhabitants in this *———, during the three months ending December 31st, 1875, was ——.

Compared with the same season in previous years, the proportion of sickness among the people of this *———, during the three months ending December 31st, 1875, was ———.

The greatest number of the deaths were from the diseases or causes (named in the order of greatest number), as follows: ———.

The greatest number of cases of sickness was from diseases as follows: ———.

To the best of my knowledge and belief, during the three months ending December 31st, 1875, cases have occurred of epidemic, infectious, or contagious diseases, as follows: Of small-pox, —— cases; of cholera, —— cases; of scarlet fever, —— cases; of typhoid fever, —— cases; of measles, —— cases; of whooping-cough, —— cases; of cerebro-spinal meningitis, —— cases; of diphtheria, —— cases.

The date of the first case of each disease was as follows: Of small-pox, ———; of cholera, ———; of scarlet fever, ———; of typhoid fever, ———; of measles, ———; of whooping-cough, ———; of cerebro-spinal meningitis, ———; of diphtheria, ———.

The date of the last case was as follows: Of small-pox, ———; of cholera, ———; of scarlet fever, ———; of typhoid fever, ———; of measles, ———; of whooping-cough, ———; of cerebro-spinal meningitis, ———; of diphtheria, ———.

Cases of epidemic, infectious, or contagious diseases now prevail as follows: Of small-pox, —— cases; of cholera, —— cases; of scarlet fever, —— cases; of typhoid fever, —— cases; of measles, —— cases; of whooping-cough, —— cases; of cerebro-spinal meningitis, —— cases; of diphtheria, —— cases.

The number of deaths during the three months ending December 31st, 1875, from epidemic, infectious, or contagious diseases, is as follows: From small-pox, ——; from cholera, ——; from scarlet fever, ——; from typhoid fever, ——; from measles, ——; from whooping-cough, ——; from cerebro-spinal meningitis, ——; from diphtheria, ——.

So far as known, the sources from which the diseases were derived were as follows:† Of small-pox, ——; of cholera, ——; of scarlet fever, ——; of typhoid fever, ——; of measles, ——; of whooping-cough, ——; of cerebro-spinal meningitis, ——; of diphtheria, ——.

In my opinion, cases of disease have occurred within the jurisdiction of this board during the three months ending December 31st, 1875, that have not been reported to me officially, as follows: Of small-pox, —— cases; of cholera, —— cases; of scarlet fever, —— cases; of typhoid fever, —— cases; of measles, —— cases; of whooping-cough, —— cases; of cerebro-spinal meningitis, —— cases; of diphtheria, —— cases. *These cases are included in the foregoing statement.*

The number of cases of diseases on my record which have not been reported to the State Board of Health, is ——.

I attribute the ‡—— in this *——, during the three months ending December 31st, 1875, to the following causes or circumstances: ——.

In my opinion the principal sources of danger to life or health in this *—— at the present time are as follows: ——.

During the three months ending December 31st, 1875, the climatic conditions observed by me were as follows: ——.

The name of the physician appointed as Health Officer of this Board is——. His P. O. address is ——. My own P. O. address is ——.

I hereby certify that, to the best of my knowledge and belief, the statements in the foregoing report are correct.

Dated ——, 1876.

Signed, —— ——,
Clerk of the Board of Health§ for the * —— *of* ——.

FOOT-NOTES AND OTHER INSTRUCTIONS.

* Insert the word township, city, or village.

† After each disease insert the words, "the disease was contracted in the city of ——," "or at the school in ——," "in a room occupied by persons sick with the same disease, —— time since," "by means of clothing worn by patient with same disease," etc., etc., as the facts may be. In the case of typhoid fever, if the privy was near the well, or within the dwelling, state the facts.

‡ Insert the words "excessive mortality," "excessive sickness," "general healthfulness," or otherwise express the facts.

§ Section (1692) 1, of Chapter XLVI., Compiled Laws of 1871, provides that "The supervisor and justices of the peace of every township, respecting which no other provision is or shall be made by law, shall be a board of health for their respective townships, and *the township clerk shall be the clerk of such board*, and shall keep a record of their proceedings in a book to be provided for that purpose at the expense of the township."

In filling blanks followed by such words as "deaths," "cases," etc., numbers should be stated if possible, either in words or figures, and "0" should be written where that expresses the truth, for the reason that *a blank space indicates that the item has been overlooked.*

Please answer the questions as they are printed, and in the blanks left for the purpose. *Do not change or mark out any of the printed matter.* If you wish to communicate any item which will not go in the blank as printed, please write on a separate sheet of paper.

PLEASE FILL ALL BLANKS IN SOME WAY, TO SHOW THAT NONE HAVE BEEN OVERLOOKED.

In accordance with the law on the subject, a large number of clerks of local boards of health responded to the foregoing circular, and returned the blanks for the special report, properly filled out; but some clerks failed to do so, or at least reports were not received from all clerks. This is extremely annoying, because it renders it impossible to compile statements for counties and for the State as a whole, for the reason that if one or two in a county fail to comply with the law, no statement for the county can be compiled, and great injustice is done to the cause of public health, and the labors of even those clerks who have faithfully performed their duties are not as valuable as they would be if it were possible to group all together and obtain general statements for the several counties and for the State.

The names of the clerks who are delinquent in these duties are generally known and on record at the office of the Board; and perhaps the best way of doing justice to those clerks who do perform their duties properly, and to all

concerned, will be to publish the shorter list of names and residences of those who do not comply with the law.

The data supplied by those clerks that have reported is valuable, and although no compilation of it appears in this Report, it has been used for references in the office, and will undoubtedly subserve many useful purposes hereafter.

CIRCULAR TO OFFICERS OF LOCAL BOARDS OF HEALTH.

After the last, the Third, Annual Report of this Board was printed and ready for distribution, a circular was prepared, on a postal card, and a copy sent to the President of the local board of health in each city, village, and township in the State; a copy was also sent to the Clerk of the local board of health in each city and village, and a copy to the Health Officer in each city in the State. The Clerks of boards of health in the townships are the township clerks, and have charge of or access to the township library which receives a copy of the Report of this Board from the Secretary of State. Excepting the sentence relative to the official title of the person addressed, the circulars to these officers were the same, and were as follows:

OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH,
Lansing, Mich.,.....,.....*1876.*

SIR:—Please call on your County Clerk for a copy of the "Third Annual Report of the Secretary of the State Board of Health," for the year 1875, which has been forwarded in his care for you as President of a local Board of Health. Please preserve the Report for the use of yourself and successors in office. The number of copies printed is not sufficient to furnish one to every member of the local Boards of Health; but, as has been done with the previous Reports, one copy is placed in each City, Village, and Township Library.

Allow me to respectfully call your attention to a circular issued to the president of your board in 1874, and which was reprinted on pages xi.-xvi. of the Second Annual Report; also to the circular to the clerk of your Board, reprinted on pages xviii. and xix. of the Second Report, and on pages xxxviii.-xxxix. of this Third Report. It is hoped that if your Board has not done so, it will immediately have printed and distributed among physicians and householders, the blank for notices of diseases dangerous to the public health, recommended on page xii. and printed on page xiii. of the Second Report. Sections 1734 and 1735, Compiled Laws of 1871, should be printed on the back of each blank.

If the clerk of your board has not already begun a Record, it is again respectfully suggested that your Board of Health direct him to procure a blank Record and begin it as soon as cases of diseases dangerous to the public health are reported to him. The form recommended by this Board is printed on page xxiii., and the price at which sheets of such blank form may be purchased is stated on page xix. of the SECOND Report.

Very respectfully,
HENRY B. BAKER,
Secretary of the State Board of Health.

WEEKLY REPORTS OF PREVAILING DISEASES.

A knowledge of the nature and extent of prevalence of at least the several prominent diseases, throughout the State, has, from the first organization of the Board, been considered desirable. At the meeting of the Board in July, the Secretary presented a plan, similar to one recently tried by the Massa-

chusetts State Board of Health, and was authorized to proceed with the project. The plan is that a Record be kept by the Health Officers of all cities in Michigan, and by those regular correspondents of the Board who will consent to do so, and that for each week a Report be sent to the Secretary of the State Board of Health. This "report" is so planned as to be quite easily and rapidly made out, on a postal card blank supplied by the State Board of Health. On the side for the address is printed the address of the Board at Lansing. The side to be used for the report is as follows:

Diseases prevalent in.....

.....*during the week ending*

Saturday..... *187*....

a. Disease of greatest prevalence 1, disease having next greatest number of cases 2, and so on. Write "0" opposite diseases not prevalent.
b. The sign = indicates the usual severity, + indicates more, — less than the usual severity.
Please mail this as soon as convenient after close of week specified.

	Prevalence. Order. See a.	Severity. See b.
Bronchitis	--	--
Cerebro-Spinal Meningitis	--	--
Cholera Infantum	--	--
Cholera Morbus	--	--
Consumption (Pulmonary)	--	--
Croup (Membraneous)	--	--
Diphtheria	--	--
Diarrhea	--	--
Dysentery	--	--
Erysipelas	--	--
Fever, Intermittent	--	--
Fever, Remittent	--	--
Fever, Typhoid (Enteric)	--	--
Fever, Typho-malarial	--	--
Influenza	--	--
Measles	--	--
Pneumonia	--	--
Puerperal Fever	--	--
Rheumatism	--	--
Scarlatina	--	--
Small-pox	--	--
Whooping-Cough	--	--
	--	--
	--	--
	--	--
	--	--

.....

.....*M.D.*

The blanks for the Record are also supplied by the Board, and are of a convenient form. The leaves are of the same size, and each alternate page is substantially the same as the postal blank, and the page opposite is ruled for remarks concerning the diseases for the week.

"This Record is intended for the use and future reference of the person making it,

and also to render it possible for him to replace any reports which fail to reach the Secretary of the Board, and to be better prepared at all times to contribute useful information relating to Public Health."

"A copy of the Record, or, if no record is kept, a report for each week to be sent as soon as possible after the end of the week, to the Secretary of the State Board of Health, Lansing, Michigan."

CIRCULAR TO HEALTH OFFICERS OF CITIES, AND TO CORRESPONDENTS, RELATIVE TO WEEKLY REPORTS OF PREVAILING DISEASES.

The circular sent to the regular correspondents was so worded as to ask the question whether they would undertake to make such reports. To such as have expressed a willingness to undertake the work, postal blanks, etc., have been furnished. The law requires Health physicians of all local boards of health to report to the State Board "whenever required to do so by the State Board of Health." The circular sent to the Health Officer of each city in the State was as follows:

[13.] OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH,
Lansing, Michigan,.....*187*...

To.....,

.....,

SIR:—By this mail I send you a blank Record, and.....postal card blanks for return of weekly statement of prevailing diseases (*not deaths*) in your.....
Hereafter please fill out and return to this Office one report for each calendar week. A similar report is now required from each city in the State, in accordance with the last clause of Sec. 8, Act No. 81, Laws of Michigan, 1873.* Voluntary reports are also expected from quite a large number of regular correspondents of this Board.

It is not expected that positive and exact information on this subject can now be obtained. Well considered estimates are all that is asked. It is thought, however, that the Chief Medical Officer of Health in each city, and the prominent physicians who act as correspondents of this Board, can approximate the truth very nearly, each for his own locality, and that a series of such estimates for the year will furnish useful data for study. It is hoped that by this means more timely information may be received concerning the occurrence and course of epidemic and other diseases, and that many diseases may thus be studied to better advantage.

It is intended that each officer or person who contributes reports shall eventually receive whatever of value may be wrought out from the union of all such reports sent in from the different parts of the State.

Please acknowledge receipt of the postal card blanks, blank record, and of this circular on the blank enclosed.

A stamped envelope is also enclosed for your use in sending to this Office any information or suggestion which you may wish to make, and which cannot conveniently be placed at the bottom of the postal card blanks. Such facts and suggestions will be thankfully received at any time, and an effort made to replace postage thus used.

If by any means your postal card blanks should be mislaid, or anything should happen which would interrupt your reports, please give timely notice to this Office, so that,

* Laws of 1873, Act No. 81, "Sec. 8. It shall be the duty of the health physician, and also of the clerk of the local board of health in each township, city, and village in this State, at least once in each year, to report to the State Board of Health their proceedings, and such other facts required, on blanks and in accordance with instructions received from said State Board. They shall also make special reports whenever required to do so by the State Board of Health."

if possible to prevent it, no break may occur. More blanks will be sent to you when these have been used.

By direction of the State Board of Health.

Very Respectfully,

HENRY B. BAKER,

Secretary.

The promptness with which a large number of the regular correspondents of the Board have responded to this appeal for still further gratuitous labor on their part is creditable to their philanthropy, and gives evidence of a real desire to aid progress in sanitary science by actual contributions of time and thought. Although apparently against their pecuniary interests as practicing physicians, and many of the correspondents are the leading physicians in their respective localities, such action must eventually have its reward. As regards returns from the Health Officers of the cities, they are not all quite as prompt, although from those cities where an intelligent physician has been appointed as Health Officer of the city, it is believed we have good prospect of receiving satisfactory weekly reports. Several of these have promptly and cordially responded, and in one or two cities in which no Health Officer has been appointed, the city clerk or recorder has reported. The table for the month of September, published herewith, will show the cities for which reports were then received, and the names of the health officers reporting therefor. It also shows the localities and names of the regular correspondents that contributed at that time. The list has been considerably increased since that time, and it is hoped and expected that it will soon be sufficiently large and so distributed as to furnish an entirely satisfactory report to this Board each week for the entire State. If this can be accomplished, it will place the office of this Board in constant and continuous possession of a good degree of knowledge of the condition of the health of the people, and render it possible for the Board to respond for the State to the question: "How do you do?" as satisfactorily as does the Signal Service Bureau to the question: "How is the weather?" This, however, is only a very imperfect hint of the great usefulness of the system, if it can be successfully carried out, and it now seems probable that it can be done.

It is not claimed that the system starts out perfect in all its details, but it is hoped that useful amendments will be made as fast as practicable. It would be easy to plan amendments now, but those which have thus far occurred to the writer all involve additional labor on the part of correspondents and health officers. How much additional labor for the advancement of knowledge in this direction voluntary correspondents will be willing to undertake, is a question, but it has not been thought best to ask for more for the year 1877. Nevertheless, it may be best to indicate briefly some of the modifications which if adopted would add very much to the completeness of our knowledge of the subject, so that if there is among the correspondents a strong desire to take up additional labor of this kind, the details can be conveniently arranged. By turning back to the form of the postal card blank now used, it will be seen that the "order of prevalence" and the comparative "severity" is reported, and from this valuable results are obtained; but if we can add a column which shall give us, concerning each disease mentioned, the information whether the disease is increasing or declining in prevalence, and a column telling us whether it is more or less than usually prevalent or about the same in prevalence as in former years, provision will have been made for still more useful results. As

regards the State at large, this may now be inferred and sometimes even positively ascertained, but as regards the individual localities, a disease like intermittent fever for instance, may be prevalent for a long time and the weekly report not at any time show whether it is more or less than usually prevalent, although the reports as now made do show which disease is most prevalent, and therefore from which there is then the greatest danger.

PROPOSED POSTAL CARD BLANK.

Modified as above suggested, the record and the postal blank would be about as follows:

Diseases prevalent in.....

.....*during the week ending*

Saturday *187*.....

	Prevalence.			Severity.
	Order a.	Week b.	Year c.	d.
Bronchitis				
Cerebro-Spinal Meningitis				
Cholera Infantum				
Cholera Morbus				
Consumption (Pulmonary)				
Croup (Membraneous)				
Diphtheria				
Diarrhea				
Dysentery				
Erysipelas				
Fever, Intermittent				
Fever, Remittent				
Fever, Typhoid (Enteric)				
Fever, Typho-malarial				
Influenza				
Measles				
Pneumonia				
Puerperal Fever				
Rheumatism				
Scarlatina				
Small-pox				
Whooping-Cough				

a. Disease of greatest prevalence 1, disease having next greatest number of cases 2, and so on. Write "0" opposite diseases not prevalent. A blank space indicates that the item has been overlooked.
b. Compared with preceding week the sign = indicates the same, + greater, — less prevalence.
c. Compared with previous years, the = indicates the same, + indicates greater, — indicates less prevalence.
d. The sign = indicates the usual severity, + indicates more, — indicates less than the usual severity.
Please mail this as soon as convenient after close of week specified.

.....

.....*M. D.*

TABLE 1.—Exhibiting by Localities the Diseases that Prevailed in Michigan during the Four Weeks ending September 30, 1876, as Reported by Health Officers of Cities, and by Regular Correspondents of this Board,—stating the Number of Reports Received, and for each Disease, the Percentage of Weeks Prevalent where Prevalent, and the Average Order of Prevalence when Prevalent,—thus stating the Prevalence as regards Time, and, also as regards Area, so far as is represented by the Localities.

LOCALITIES REPRESENTED, AND NAMES OF PERSONS WHO REPORTED.	Number of Reports Received.	Bronchitis.		Cerebro-Spinal Meningitis.		Cholera Infant'm.		Cholera Morbus.		Cons'm'p-tion. (Pulmo-nary.)		Croup. (M'mbra-neous.)		Diphthe-ria.		Diarrhea.		Dysen-tery.		Erysip-elas.		Fever, Intermit-tent.		Fever, Remit-tent.	
		Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. [a]
All Localities	176	[b] 73	5	[b] 63	6	[b] 69	5	[b] 56	5	[b] 43	6	[b] 35	3	[b] 48	6	[b] 91	3	[b] 73	4	[b] 61	7	[b] 96	2	[b] 79	3
HEALTH OFFICERS.																									
Alpena, G. H. Shelton	4	50	6	0	0	0	0	50	7	----	----	0	0	0	0	100	2	50	6	100	4	100	1	----	----
Charlotte, G. B. Allen	4	100	7	0	0	25	6	0	0	----	----	0	0	50	9	100	3	25	6	0	0	100	1	----	----
Corunna, J. D. Kergan	1	0	0	0	0	100	2	0	0	----	----	0	0	0	0	100	3	100	5	0	0	100	1	----	----
Detroit, J. H. Carstens	1	100	1	0	0	100	4	0	0	----	----	0	0	0	0	0	0	100	6	0	0	100	10	----	----
Grand Haven, C. W. Styles	3	0	0	0	0	100	4	100	4	----	----	0	0	0	0	100	2	100	5	33	5	100	1	----	----
Grand Rapids, J. B. Griswold	1	0	0	0	0	0	0	0	0	----	----	0	0	0	0	100	2	100	6	0	0	100	1	100	3
Ionia, Wm. B. Thomas	4	0	0	0	0	0	0	75	6	----	----	0	0	0	0	100	2	100	2	0	0	100	5	100	3
Lapeer, A. Nash	2	0	0	0	0	0	0	0	0	----	----	0	0	0	0	0	0	0	0	0	0	0	0	----	----
Port Huron, M. Northup	3	0	0	0	0	33	5	0	0	----	----	0	0	0	0	100	3	33	4	0	0	100	1	100	2
Saginaw City, N. D. Lee	4	50	4	0	0	75	6	100	7	----	----	0	0	0	0	100	5	25	7	0	0	100	1	----	----
Ypsilanti, E. Batwell	4	0	0	0	0	25	6	25	5	----	----	0	0	0	0	25	4	50	3	0	0	100	1	100	3
Wyandotte, T. J. Langlois	3	100	6	0	0	33	6	0	0	33	9	0	0	0	0	100	4	33	5	0	0	100	1	100	2
CORRESPONDENTS.																									
Albion, John P. Stoddard	2	100	2	0	0	100	2	50	2	50	2	0	0	0	0	100	2	100	2	100	2	100	1	50	1
Bangor (Bay Co.), I. E. Randall	4	100	3	0	0	100	5	100	8	----	----	0	0	100	3	100	4	100	4	100	8	100	1	100	1
Bay City, W. H. Burr	4	0	0	0	0	100	4	100	5	----	----	0	0	0	0	100	3	50	4	0	0	100	1	----	----
Benton Harbor, John Bell	4	0	0	0	0	0	0	0	0	25	5	0	0	0	0	100	3	100	2	0	0	100	1	50	3
Blissfield, Hal C. Wyman	4	0	0	0	0	0	0	0	0	----	----	50	2	50	3	50	4	75	4	0	0	100	1	----	----
Coldwater, Louis H. Wurtz [c]	4	100	3	0	0	100	4	100	6	----	----	0	0	0	0	100	6	100	9	0	0	100	1	100	2
Detroit, Leartus Connor	4	100	4	0	0	0	0	25	12	----	----	0	0	50	6	100	6	100	7	100	9	100	3	----	----
Detroit, W. H. Rouse [d]	2	100	8	0	0	100	11	100	10	----	----	0	0	100	13	100	7	100	9	100	12	100	3	100	1
De Witt, G. W. Topping	4	100	6	0	0	50	11	50	8	100	9	0	0	0	0	100	2	100	6	25	12	100	2	100	3
East Saginaw, B. B. Ross	4	25	7	0	0	75	5	50	5	0	0	0	0	0	0	75	5	75	5	0	0	100	1	25	2

East Tawas, James S. Reeves	1	0	0	0	0	0	0	0	0	----	----	0	0	0	0	0	0	0	0	0	0	0	0	0	----	----				
Edwardsburgh, J. B. Sweetland	4	75	4	0	0	100	6	100	7	0	0	25	9	0	0	100	3	100	5	100	8	100	1	50	10					
Flint, A. B. Chapin	4	75	5	0	0	100	6	50	6	25	6	0	0	50	7	100	2	25	4	75	5	100	2	100	3					
Fyfe Lake, H. T. Calkins [c]	4	0	0	0	0	0	0	25	3	----	----	0	0	0	0	100	1	50	2	0	0	25	2	----	----					
Grand Haven, L. M. S. Smith	4	50	7	0	0	100	4	50	8	25	6	50	4	25	7	100	3	100	4	50	9	100	3	75	6					
Grand Rapids, A. Hazlewood	4	75	5	100	8	100	5	25	7	----	----	0	0	25	11	100	2	25	3	0	0	100	1	----	----					
Hubbardston, H. W. Browne	4	0	0	0	0	50	6	0	0	----	----	0	0	0	0	100	5	100	6	0	0	100	4	100	3					
Hastings, C. Russell	4	25	7	25	6	75	3	100	4	----	----	25	8	0	0	100	3	100	5	0	0	100	1	----	----					
Lamont, J. C. McIlvain [f]	4	75	4	0	0	25	3	75	3	25	6	0	0	25	4	50	4	50	4	25	6	50	2	75	1					
Lyons and Muir, D. C. Spalding	4	0	0	0	0	25	5	75	5	0	0	0	0	0	0	100	4	100	5	25	8	100	2	75	2					
Marshall, Henry L. Joy	4	100	1	0	0	0	0	25	2	----	----	0	0	0	0	75	3	0	0	25	5	100	2	----	----					
Mendon, Edwin Stewart	3	0	0	0	0	0	0	33	4	----	----	0	0	33	4	100	2	33	4	0	0	100	1	----	----					
Mendon, H. C. Clapp	4	0	0	0	0	0	0	0	0	----	----	0	0	0	0	100	5	0	6	0	0	100	1	100	2					
Milford, Robert Johnston	4	50	4	0	0	0	0	25	3	----	----	0	0	0	0	100	2	25	3	0	0	100	1	----	----					
Monroe, Wm. C. West [g]	4	25	9	0	0	75	6	75	8	----	----	0	0	0	0	100	4	100	6	0	0	100	2	100	3					
Muskegon, John M. Cook	1	0	0	0	0	100	2	100	6	----	----	0	0	0	0	100	4	100	5	0	0	100	1	----	----					
North Lansing, O. Marshall	4	75	5	25	5	25	5	25	5	100	5	0	0	0	0	100	4	100	3	0	0	100	1	100	3					
Northville, J. M. Swift	1	0	0	0	0	----	----	0	0	----	----	0	0	0	0	----	----	0	0	0	0	0	0	----	----					
Otsego, Milton Chase [h]	4	0	0	100	4	0	0	25	3	----	----	0	0	0	0	50	4	0	0	50	3	100	1	25	2					
Paw Paw, J. Andrews [i]	4	0	0	0	0	25	3	25	3	----	----	0	0	0	0	50	2	25	2	0	0	100	2	100	1					
Pontiac, John P. Wilson	4	0	0	0	0	75	5	50	6	25	6	0	0	0	0	100	4	100	2	0	0	100	1	100	4					
Port Huron, H. R. Mills [j]	4	0	0	0	0	0	0	0	0	25	3	0	0	0	0	0	0	0	0	0	0	100	1	25	2					
Port Sanilac, J. M. Loop	4	0	0	0	0	0	0	0	0	----	----	25	3	0	0	75	1	25	3	50	3	25	4	----	----					
Sturgis, N. I. Packard	1	0	0	0	0	0	0	0	0	----	----	0	0	0	0	100	2	0	0	0	0	100	1	----	----					
Tecumseh, C. M. Woodward	4	50	3	0	0	50	3	0	0	----	----	0	0	0	0	100	2	50	2	0	0	100	1	----	----					
Three Rivers, L. S. Stevens	4	0	0	0	0	50	3	50	4	----	----	0	0	0	0	100	3	75	3	0	0	100	1	----	----					
Utica, Wm. Brownell	4	0	0	0	0	75	3	25	6	----	----	0	0	0	0	75	3	50	5	0	0	100	3	50	1					
Vermontville, Wm. Parmenter [k]	4	0	0	0	0	0	0	0	0	----	----	0	0	0	0	75	2	0	0	25	4	100	1	50	3					
Walled Lake, E. A. Chapman [l]	3	0	0	0	0	0	0	67	3	----	----	0	0	0	0	100	3	0	0	0	0	100	1	33	2					
Wyandotte, E. P. Christian	4	50	3	----	----	50	3	50	3	----	----	----	----	25	4	100	3	----	----	----	----	100	1	100	1					

[a] The disease having the greatest number of cases is 1, in the order; the disease having the next greatest number, 2; and so on. Diseases not prevalent were to be reported by "0." In computing this table, a fraction less than one-half is disregarded, a fraction equal to one-half or greater than one-half is counted as a whole number.

[b] Percentage of weeks prevalent, *where prevalent*; for instance, if in two out of four reports from a given locality, the disease was reported prevalent, the Percentage of Prevalence for that locality was 50. This line is not an average for all localities, but only for those localities where the disease was reported prevalent.

[c] For J. H. Beech, M. D.

[d] Sent two more reports which could not be compiled because the Order of Prevalence was not given by this method.

[e] Also reported for one week, Uterine Hemorrhage, Order of Prevalence, 2; Disease of Kidneys, Order of Prevalence, 3; and for two weeks, "Malarial Infection," Order of Prevalence 3.

[f] Also reported for one week one case of Placenta Prævia, and one case of Dyspepsia.

[g] Also reported Pharyngitis, Percentage of week's Prevalent, 100, Average Order of Prevalence when Prevalent, 1.25.

[h] Also reported Cystitis one week, Order of Prevalence, 2; Delirium Tremens one week, Order of Prevalence, 3; Biliary Colic from passage of Gall Stone, one week, Order of Prevalence, 3.

[i] Also reported Urticaria one week, Order of Prevalence, 3.

[j] Also reported for one week Retro-version of the Uterus, order of Prevalence 2.

[k] Also reported for one week Asthma, order of Prevalence 4; and for one week General Debility, order of Prevalence 2.

[l] For J. M. Hoyt, M. D.

TABLE 1.—Continued.

LOCALITIES REPRESENTED, AND NAMES OF PERSONS WHO REPORTED.	Number of Reports Received.	Fever, Typhoid. (Ent'ric.)		Fever. (Typho-malarial.)		Influenza.		Measles.		Pneumonia.		Puerperal Fever.		Rheumatism.		Scarlatina.		Small-Pox.		Whooping-Cough.		Neuralgia.	
		Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a	Percentage of Weeks Prevalent.	Average Order of Prevalence when Prevalent. a
All Localities	176	b 66	5	b 66	4	b 72	4	b 88	8	b 62	7	b 33	8	b 74	5	b 50	7	b 75	10	b 76	6	b 25	3
HEALTH OFFICERS.																							
Alpena, G. H. Shelton	4	50	5			0	0	0	0	100	5	0	0	100	5	0	0	0	0	0	0		
Charlotte, G. B. Allen	4	100	6	100	3	75	4	0	0	0	0	0	0	100	4	50	8	0	0	0	0		
Corunna, J. D. Kergan	1	100	3	100	4	100	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Detroit, J. H. Carstens	1	100	1			0	0	0	0	0	0	0	0	100	1	0	0	0	0	100	3		
Grand Haven, C. W. Styles	3	0	0			100	4	0	0	0	0	33	8	100	8	0	0	0	0	0	0		
Grand Rapids, J. B. Griswold	1	0	0			100	4	0	0	0	0	0	0	100	5	0	0	0	0	0	0		
Ionia, Wm. B. Thomas	4	0	0	100	5	0	0	0	0	50	7	0	0	100	7	0	0	0	0	0	0		
Lapeer, A. Nash	2	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Port Huron, M. Northup	3	33	5			67	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Saginaw City, N. D. Lee	4	100	2			75	4	0	0	25	8	0	0	100	6	0	0	0	0	0	0		
Ypsilanti, E. Batwell	4	0	0			50	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Wyandotte, T. J. Langlois	3	33	4	33	7	0	0	0	0	0	0	0	0	100	3	0	0	0	0	33	8		
CORRESPONDENTS.																							
Albion, John P. Stoddard	2	50	2	50	2	100	1	0	0	50	2	0	0	100	2	0	0	0	0	100	2		
Bangor, Bay Co., I. E. Randall	4	100	7	75	4	0	0	0	0	100	7	25	8	100	4	50	5	0	0	100	7		
Bay City, W. H. Burr	4	25	7			0	0	0	0	0	0	0	0	100	3	0	0	0	0	0	0		
Benton Harbor, John Bell	4	0	0	0	0	50	4	0	0	0	0	0	0	75	4	0	0	0	0	0	0	25	3
Blissfield, Hal C. Wyman	4	100	5			50	3	0	0	75	5	0	0	0	0	0	0	0	0	0	0		
Coldwater, Louis H. Wurtz	4	50	8			0	0	0	0	100	8	0	0	100	8	0	0	0	0	75	10		
Detroit, Leartus Connor	4	0	0	25	2	100	3	100	10	100	12	0	0	100	5	100	12	100	13	100	11	25	5
Detroit, W. H. Rouse	2	100	5	100	2	100	3	0	0	100	9	0	0	100	9	0	0	50	7	100	12		
DeWitt, G. W. Topping	4	50	6	50	9	0	0	0	0	25	14	0	0	100	8	0	0	0	0	100	5		
East Saginaw, B. B. Ross	4	0	0	100	6	50	5	0	0	0	0	0	0	25	3	0	0	0	0	100	3		
East Tawas, Jas. S. Reeves	1	0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Edwardsburgh, J. B. Sweetland	4	0	0	100	4	100	8	0	0	75	10	50	13	50	8	75	11	0	0	0	0		
Flint, A. B. Chapin	4	25	4	25	4	25	6	0	0	25	7	0	0	100	6	25	5	0	0	25	5		
Fyfe Lake, H. T. Calkins	4	0	0			25	2	0	0	0	0	25	2	0	0	0	0	0	0	0	0	25	2

Grand Haven, L. M. S. Smith	4	25	7	0	0	75	5	0	0	100	7	0	0	75	5	0	0	0	0	25	6	----	----	
Grand Rapids, A. Hazlewood	4	100	7	----	----	100	3	75	6	0	0	0	0	0	0	0	0	0	0	100	9	----	----	
Hubbardston, H. W. Browne	4	100	1	50	3	75	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	----	----	
Hastings, C. Russell	4	100	6	----	----	0	0	0	0	25	7	0	0	25	6	0	0	0	0	0	0	----	----	
Lamont, J. C. McIlvain	4	25	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	3	----	----	
Lyons and Muir, D. C. Spalding	4	0	0	25	3	0	0	0	0	0	0	0	0	50	7	0	0	0	0	100	4	----	----	
Marshall, Henry L. Joy	4	25	2	----	----	100	2	0	0	0	0	0	0	100	2	0	0	0	0	0	0	----	----	
Mendon, Edwin Stewart	3	0	0	67	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	4	----	----	
Mendon, H. C. Clapp	4	75	4	100	3	0	0	0	0	0	0	0	0	25	5	0	0	0	0	0	0	----	----	
Milford, Robert Johnston	4	0	0	----	----	0	0	0	0	0	0	0	0	25	3	0	0	0	0	0	0	----	----	
Monroe, Wm. C. West	4	75	7	100	5	0	0	0	0	0	0	0	0	100	7	0	0	0	0	0	0	----	----	
Muskegon, John M. Cook	1	100	7	----	----	0	0	0	0	0	0	0	0	100	3	0	0	0	0	100	4	----	----	
North Lansing, O. Marshall	4	100	5	25	4	0	0	0	0	100	4	0	0	100	4	25	5	0	0	25	2	----	----	
Northville, J. M. Swift	1	0	0	----	----	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	----	----	
Otsego, Milton Chase	4	0	0	25	8	0	0	0	0	0	0	0	0	25	3	0	0	0	0	0	0	----	----	
Paw Paw, J. Andrews	4	75	4	----	----	0	0	0	0	0	0	0	0	25	3	0	0	0	0	0	0	----	----	
Pontiac, Jno. P. Wilson	4	0	0	----	----	0	0	0	0	0	0	0	0	25	5	0	0	0	0	0	0	----	----	
Port Huron, H. R. Mills	4	2	4	----	----	25	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	----	----	
Port Sanilac, J. M. Loop	4	0	0	----	----	50	3	0	0	0	0	0	0	75	2	0	0	0	0	0	0	----	----	
Sturgis, N. I. Packard	1	0	0	----	----	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	----	----	
Tecumseh, C. M. Woodward	4	0	0	----	----	100	2	0	0	0	0	0	0	25	3	0	0	0	0	0	0	----	----	
Three Rivers, L. S. Stevens	4	50	3	----	----	50	3	0	0	25	4	0	0	100	3	50	3	0	0	0	0	----	----	
Utica, Wm. Brownell	4	50	5	----	----	100	3	0	0	25	6	0	0	25	5	0	0	0	0	0	0	----	----	
Vermontville, Wm. Parmenter	4	50	3	----	----	0	0	0	0	25	4	0	0	0	0	0	0	0	0	0	0	----	----	
Walled Lake, E. A. Chapman	3	0	0	----	----	67	3	0	0	0	0	0	0	67	4	0	0	0	0	0	0	----	----	
Wyandotte, E. P. Christian	4	----	----	----	----	25	3	----	----	50	4	----	----	25	4	----	----	----	----	----	----	----	----	

a The disease having the greatest number of cases is 1, in the order; the disease having the next greatest number, 2; and so on. Diseases not prevalent were to be reported by "0." In compiling this table a fraction less than one-half is disregarded, a fraction equal to or greater than one-half is counted as a whole number.

b Percentage of weeks prevalent, *where prevalent;* for instance, if in two out of four reports from a given locality, the disease was reported prevalent, the Percentage of Prevalence for that locality was 50. This line is not an average for all localities, but only for those localities where the disease was reported prevalent.

TABLE 2.—Exhibiting a Summary Relative to Diseases Prevailing in Michigan During the Four Weeks ending September 30, 1876.—Indicating the Prevalence, as regards both Time and Area, and also the Comparative Severity of each Disease, During the time Specified.

PREVALENT DISEASES.	Postal-Card Reports Received. [a]	Number of Reports Stating Prevalence of.	Percentage of Reports Stating Prevalence of. [b]	Persons that Reported Concerning.	Persons that Reported Prevalence of.	Percentage of Persons Reporting Prevalence of. [c]	Average Times Reported Prevalent, where Prevalent. [d]	Percentage of Time Reported Prevalent, where Prevalent. [e]	Average Order of Prevalence. [f]	Times Reported **More** than Usually Severe. [g]	Times Reported **Usually** Severe.	Times Reported **Less** than Usually Severe.	Difference between "Times reported More," and Times "less than Usually Severe." [h]
Average for All Diseases	176	52	29	52	20	39	2.31	63	6	7	30	11	—4
Bronchitis	176	62	35	52	24	46	2.58	73	5	1	48	13	—12
Cerebro-Spinal Meningitis	176	g 10	6	52	4	8	2.50	63	6	----	9	2	— 2
Cholera Infantum	176	74	42	52	32	62	2.31	69	5	8	34	24	—16
Cholera Morbus	176	72	41	52	34	65	2.12	56	5	3	42	19	—16
Consumption (Pulmonary) [i]	176	16	9	52	10	19	1.60	43	6	----	10	1	— 1
Croup (Membraneous)	176	7	4	52	5	10	1.40	35	3	1	3	2	— 1
Diphtheria	176	19	11	52	11	21	1.73	48	6	3	9	6	— 3
Diarrhea	176	150	85	52	47	90	3.19	91	3	14	83	35	—21
Dysentery	176	100	57	52	41	79	2.44	73	4	14	51	23	— 9
Erysipelas	176	35	20	52	16	31	2.19	61	7	1	20	13	—12
Fever, Intermittent	176	164	93	52	49	94	3.35	96	2	36	94	11	+25
Fever, Remittent [i]	176	83	47	52	29	56	2.86	79	3	17	48	4	+13
Fever, Typhoid (Enteric)	176	67	38	52	30	58	2.23	66	5	4	35	14	—10
Fever (Typho-Malarial) [i]	176	45	26	52	19	37	2.37	66	4	10	25	5	+ 5
Influenza	176	68	39	52	27	52	2.52	72	4	9	42	9	----
Measles	176	g 7	4	52	2	4	3.50	88	8	----	7	1	— 1
Pneumonia	176	44	25	52	19	37	2.32	62	7	2	25	11	— 9
Puerperal Fever	176	g 5	3	52	4	8	1.25	33	8	2	5	1	+ 1
Rheumatism	176	94	53	52	37	71	2.54	74	5	5	58	22	—17
Scarlatina	176	15	9	52	7	13	2.14	50	7	1	9	4	— 3
Small-Pox	176	g 5	3	52	2	4	2.50	75	10	----	6	----	----
Whooping-Cough	176	41	23	52	17	33	2.41	76	6	3	23	11	— 8
Neuralgia [i]	176	3	3	52	3	6	1.00	25	3	1	1	----	+ 1

[a] Not every one of the 52 reporters sent in a report for each of the four weeks, so that, instead of 208, the actual number of reports received was 176.

[b] This third column is the Per cent. of the second to the first column, and indicates, in a general way, the length of time of prevalence, combined with the area of prevalence.

[c] Indicates extent of Area of Prevalence.

[d] Obtained by dividing the second column by the fifth. The number of persons reporting each disease prevalent is shown in the next column but one preceding this—the fifth column. The greatest number of reports from any one reporter was 4; the average number was 3.38, because of what is stated in footnote [a], above.

[e] For area of prevalence, see sixth column,—next but one preceding this. This column is taken from the line for "All Localities," in Table 1. See footnote [b], Table 1.

[f] The disease having the greatest number of cases is 1, in the order; the disease having the next greatest number of cases is 2, and so on. Diseases not prevalent were to be reported by "0."

[g] The facts concerning Severity were, in some instances, stated more times than the disease was reported prevalent; probably because by some reporters the disease was not considered prevalent unless there were more than the usual number of cases. It may be best to change the word "prevalent" to *existing*, or have it understood to apply to the disease if there is a single case present.

[h] The + sign indicates that the times reported "more" exceed those reported "less;" the — sign that the times reported "less" exceed those reported "more," the number "more" or "less" being indicated by the figures.

[i] Not printed on the first cards sent out, and probably for this reason not reported regularly.

The plan was not at first understood by all correspondents. Some of the first reports sent in were made on different plans, a few of which, in order to guard against errors in future, may be referred to as follows: One correspondent divided all diseases into three classes, and placed the figure 1 opposite all of which there were more than the average number of cases; the figure 2 opposite those about the average, and 3 opposite those of which there were less than the average number of cases. More than one correspondent divided all diseases into ten classes, and reported on that plan, according to comparative prevalence, on a scale of ten. It is believed that at present the reports are uniformly made on the plan intended, which is to place as 1, in the order of prevalence, the disease of which there is the greatest number of cases during the week for which the report is made; and to include all cases, whether the patients were taken sick in that week or previously, so long as they are actually sick with that disease; to place as 2, in the order of prevalence, the disease of which there is the next greatest number of cases, and to continue on in this manner until all diseases, of which a case is present, are named.

It is well to have in mind just what information is obtained by present methods, and not to base any conclusions thereon that are not warranted by the facts. The "order of prevalence," taken by itself, is not a uniform and exact measure of the actual prevalence. A given disease may prevail with equal severity in two places, say, for instance, DeWitt and Detroit, and in the first place be marked 5, and in the other 10, in the order of prevalence, simply because of a greater number of diseases represented at Detroit. If it prevails at all in the sparsely settled localities, its order of prevalence is likely to be high, because not so many diseases are represented as in the larger cities. The order of prevalence may vary in the same place, and with the same reporter at different times, simply because of there being a greater or less number of diseases to report. Perhaps the exact truth cannot be positively and accurately reported, except by per cent. of cases to inhabitants; and even then the age and sex of the inhabitants should be considered with reference to each disease. Absolute certainty in this matter cannot be reached at one bound, but we must be satisfied with fair progress toward more exact knowledge. Perhaps the modifications suggested on a preceding page may be found desirable in the near future, but even what is now collected will be of great value as an advance on our previous almost positive ignorance on the subject.

ILLUMINATING OILS.

During the year, as in past years, the Board has devoted considerable thought and labor to the subject of oil inspection, the securing of a certain standard as regards volatility and inflammability in the illuminating oil used in this State, and the best methods of lessening the danger from the volatile products of petroleum usually found in kerosene. One committee of the Board is, at the time of this writing, still engaged on these subjects, and the conclusions are not yet ready for publication. Some work and observations on the subject have fallen to the Secretary, and although the greater part cannot profitably be considered in this connection, record may here be made of an account of some experiments made with an idea of still further testing the view, put forth by the Secretary, that the nature of the "burner" that is used and the breaking of lamp chimneys, have much to do with the danger from the use of kerosene for illuminating purposes.

In the following account of experiments, the temperature is stated of the metallic collar which, although not usually in contact with the oil in the lamps, may be so at any time by movement of the lamp, as in its being carried about the room, and especially in being carried up stairs. By these experiments it will be seen that the temperature of this part of the lamp is such that oil that gives off an explosive vapor as such temperatures as 110°, or 120° F. is not safe to use in such lamps, if they are to be moved about, even when the lamp chimney is on and entire, and when a lamp chimney breaks, at least some of these lamps become sufficiently heated to render it certainly unsafe to move the lamp in such a manner as to bring the oil in contact with the top or collar of the lamp, even though the oil will bear the test now required by law in this State. It should be borne in mind that the test in this State, although higher than in those States where it has been fixed through the influence of refiners and dealers, was reduced ten degrees by the legislature in 1875, and oil that does not give off an explosive vapor at a less temperature than 140° F. is now permitted to be used. In one instance mentioned in the experiments the temperature of the collar of the lamp reached 144° in ten minutes after the chimney had been removed. This removal of the chimney was to make it equivalent to those cases in which, from some cause, the chimney breaks while the lamp is temporarily left by itself for a few minutes. In these experiments the lamps were new, the burner new and clean, the wicks new, and the oil used was fresh from the barrel, and of good quality. Oil that contains much paraffine will not only not burn well, but will cause a clogging of the wick and a much higher temperature of the lamp than good well-refined oil, and in the experiments mentioned on page xxx. of the last Report the temperature of the collar of a lamp in which such oil was burning reached a temperature of 150° F., in a room where the temperature of the air was 70° F., and this while the lamp chimney was on the lamp. In the last Report, page xxxii., attention was asked to the subject of a test for quality of the oil as regards freedom from paraffine. It still seems desirable, and an important point to be secured in the interest of safety from those horrible injuries caused by explosions of lamps and burning by oil.

ACCOUNT OF EXPERIMENTS MADE BY MR. H. H. LARNED, OF LANSING, MICH.

KINDS OF BURNERS TRIED:

Miller's No. 2 Sun-Hinge.
Miller's Improved No. 2 Sun-Hinge.
Collins' patent No. 2 Ordinary Sun.
Miller's No. 2 Venus.

Temperature of room 78°,—Burners all lighted at 12 M.:

Venus Burner, in 15 minutes, 108°; in 35 minutes, 120°.*
Miller " " 20 " 110°; in 40 " 116°.*
Miller's Improved, in 25 minutes, 112°; in 45 minutes, 120°.*
Collins Burner, in 30 minutes, 101°; in 50 minutes, 110°.*

At 1:40 P. M., a thermometer was applied to each of the two Miller Burners, and at 2 P. M., Miller Burner stood at 120°, and the Improved at 126°.*

After 18 minutes' application the Collins Burner stood at 112°, and Venus at 125°.* At 2:25 the chimneys were removed from Collins (ordinary Sun Burner) and Miller Burners, and thermometers again applied, and in 10 minutes the Collins Burner stood at 130°, and Miller's at 144°; and the flame of the latter

* Temperature of "collar" of lamp,—the top part which remains after the "burner" has been removed. H. H. L.

exhibited a flashing or jumping, accompanied with a slight report. All the lamps were new, with new burners and wicks, and fresh oil was used.

Lansing, Mich., Aug. 8, 1876. H. H. LARNED.

The oil used in the above-mentioned experiments was the "water white" made by the Standard Oil Company, Cleveland, Ohio, inspected by Deputy State Inspector Canfield, of Lansing, Michigan, July 17, 1876, and branded 165° F., "fire test." The experiments were made August 8, and by request of Mr. Larned, and in order to make the experiments entirely complete, on August 12, I tested the oil, using for that purpose the State Board of Health tester and thermometer belonging to the Board. The oil "flashed,"—gave off an explosive vapor,—at 136° F., and burned continuously at 162° F. The flashing point being, by this test, five degrees lower than the law allows for oil used in this State, Mr. Canfield, on learning this, promptly brought up his apparatus for comparison, when it was found that there was a difference between the results reached by his and by that in the Office of the Board. There is also opportunity for a slight difference between two inspections made with the same apparatus, and even by the same person. Under some circumstances, there may be found a difference in the samples from the same barrel, taken at different times, one sample being from the top, after all that at the bottom has been drawn off, although of this I have as yet no positive evidence. But whenever the writer has had occasion to re-inspect oil, the conviction has been deepened that the test should be fixed by law high enough to allow of a little margin above the positively dangerous point; also that the inspecting officer should *never* allow the benefit of a doubt on the side of dangerous oil, but should always be certain that oil branded as safe, according to legal tests, shall not be found wanting when tried by re-inspection or by actual use.

Although the subject of illuminating oils and the removal of dangers connected therewith has cost the Board much anxious thought and labor, it is now a matter for very great congratulation, because of the very great infrequency of those terrible "accidents" compared even with the time when the Board began its work, and some of the same persons who labored for a State Board of Health had also previous to that time done good work for the public safety from bad oil.

But while there is opportunity for saving lives that would otherwise be needlessly sacrificed, there is occasion for further labor by this Board. There are still some sources of danger connected with illuminating oil, and it is hoped that the labors of the committee of this Board, now engaged upon their study and elucidation, will do much toward still further lessening them.

SPECIAL REPORTS AND COMMUNICATIONS TO THIS BOARD.

During the year communications have been received from health officers, from regular correspondents, and from others, containing interesting and valuable statements of facts and considerations bearing upon different subjects connected with public health. Some of them have been referred to the different committees of the Board, and a few of these appear in other parts of this volume; some have been referred to the Secretary, with authority to publish, while time and opportunity has not been found to present, at length all of such communications that have been received, to the Board during the limited time of its

sessions. A report of the work of the Board would not be complete without some mention of these communications, and a few of those not otherwise disposed of are believed to be of such value as to make it desirable that they be included herewith. These have generally been received because of an official request for further information concerning unusual sickness reported to this Board, and as those selected for publication relate to fever of a typhoid character, it has seemed best to group all together, with one such referred to the Secretary for publication, under the head of "Contributions to the study of the cause of typhoid fever." This group of special reports and communications here follows:

AN OUTBREAK OF TYPHOID FEVER AT PORT SANILAC, MICHIGAN.

Early in the spring of this year, 1876, Dr. Kedzie requested the Secretary of this Board to endeavor to obtain a knowledge of the facts concerning an outbreak of typhoid fever reported to have occurred at Port Sanilac, in this State. In accordance with this request, an account of the outbreak has been secured, mainly through the services of Geo. T. Coppernoll, Deputy Clerk of the township, and J. M. Loop, M. D., of Port Sanilac, now one of the regular correspondents of this Board. The proper presentation of the subject includes a few items not received from Dr. Loop, and could not well be given in connection with the replies by him as a correspondent, either to the circular on "Water Supply," or to the circular on "Diseases in Michigan in 1875," it is therefore published separately in this manner.

A letter from this office, dated May 8, to the Clerk of the Local Board of Health of the township of Sanilac, elicited a reply from Geo. T. Coppernoll, Deputy Clerk, stating that the newspaper account of the outbreak was correct, so far as related to the facts known, but indicating that, in his opinion, the cause was not as therein attributed, the poison from a foul drain or sewer. As one reason why he doubted, he mentioned that many persons used the water from the well supposed to have been contaminated by sewage matter from the drain above mentioned, and that only a few of these persons were sick with the disease. He stated, however, that it was true that the disease was mainly confined to the families using water from that well. He added, that "the Board of Health ordered everything cleaned up, and forbid the slaughtering of all animals within one-half mile of the village, since which time it has been comparatively healthy." This letter mentioned F. M. Garlick, M. D., and J. M. Loop, M. D., as likely to furnish information, from the physician's standpoint. A letter to Dr. Garlick was replied to by him as follows:

HENRY B. BAKER, M. D., *Secretary of the State Board of Health:*

DEAR SIR:—Yours in regard to "epidemic of typhoid" received. Would have replied sooner, but have been absent from home. The disease was not confined to one locality. I had several cases some distance from the neighborhood of Mr. Erskine's well. I think the cause of the epidemic was bad drainage and filth. I presume Dr. Loop explained quite fully, as he was here during the worst of the epidemic.

If there is any thing I can do to throw more light on the subject I will be glad to do so. I would be pleased to get a report of State Board of Health.

Yours respectfully,

Port Sanilac, June 1, 1876. F. M. GARLICK, M. D.

June 3, another letter was written to Dr. Garlick, enclosing blanks, etc., and requesting a full report on the subject. To this communication no reply was received.

A letter to Dr. Loop was replied to by him, on blank sent from this office, as follows:

To the Secretary of the State Board of Health:

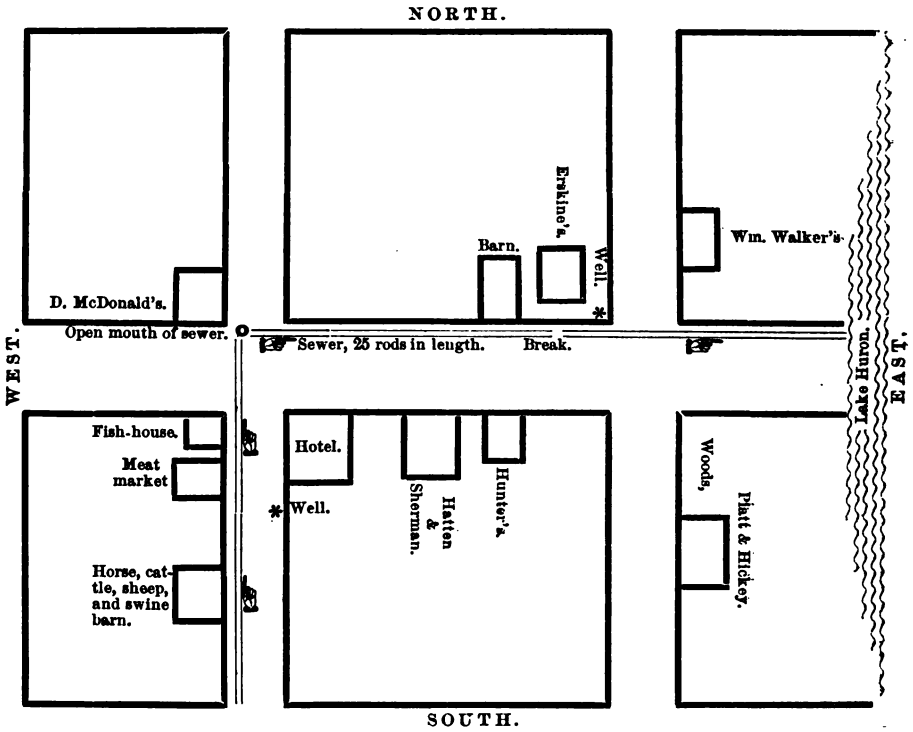
SIR:—The following is a report of cases of typhoid fever which have occurred in the village of Port Sanilac, county of Sanilac, State of Michigan:

No.	Full Name of Patient.	Sex.	Age in Years last Birthday.	Taken Sick.			Whether Died, Living, or Recovered.	Date of Death or Recovery.		
				Month.	Day.	Year.		Month.	Day.	Year.
1	George McDonald	Male	3	Dec.	6	1875	Died.	Dec.	28	1875
2	Mrs. William Walker	Female	24	"	10	"	Recovered	"	31	"
3	Mrs. William Hatten	Female	44	"	10	"	"	"	27	"
4	Mrs. Elizab'th McDonald	Female	22	"	14	"	Died.	Jan.	2	1876
5	Daniel McDonald	Male	23	"	20	"	Recovered	"	4	"
6	Bertie Hunter	Male	10	"	21	"	"	"	2	"
7	Mrs. John Woods	Female	22	"	21	"	"	"	4	"
8	Louisa Platt	Female	12	"	22	"	"	"	7	"
9	Ada Sherman	Female	3	"	27	"	Died.	"	12	"
10	Ida Erskine	Female	16	"	27	"	"	Jan.	6	1876
11	Nelson Hickey	Male	5	"	29	"	Recovered	"	7	"
12	Frank Hatten	Male	11	Jan.	1	1876	"	"	24	"
13	Albert Erskine	Male	14	"	1	"	"	"	10	"
14	Willard Hunter	Male	14	"	4	"	"	Feb.	8	"
15	Katie Hatten	Female	5	"	6	"	"	Jan.	19	"
16	Mrs. Eva Sherman	Female	20	"	7	"	Died.	"	16	"
17	Katie Sherman	Female	1	"	10	"	Recovered	"	20	"

All the cases occurred in persons using water from the well of James Erskine, Esq., with the exception of the McDonald family, who occupied a house within three or four yards of the open mouth of the sewer, and only four rods from a fresh fish shed near the meat market. All the washings from large quantities of fish, as well as from filthy hog pens and stable, went into this shallow plank sewer, carrying such an amount of filth to within ten or fifteen feet of said well, then bursting out and soaking away through the sandy earth, and probably into the well. Said well is about twelve feet deep, seven or eight feet of which is through the sand and the balance of depth into the clay. There is a descent of about eight feet from the head of the sewer to the well. It might be presumed that a filter of seven or eight feet of sand would purify the water.

The reported source of contagion or infection, in each case, was (in my opinion) as above stated.

Port Sanilac, May 20, 1876. JOSEPH M. LOOP, M. D.



Another letter of inquiry, addressed to Dr. Loop, was replied to by him as follows:

HENRY B. BAKER, M. D., *Secretary State Board of Health, Lansing, Mich.:*

DEAR SIR:—In reply to your inquiry respecting the epidemic of typhoid fever which occurred in Port Sanilac last winter, would say that the first case was that of the little son of Daniel McDonald, George, aged about three (3) years, who had not been from home, neither had any member of the family for quite a length of time. This family lived at the head of the main sewer, only a few feet from where the small sewer, which takes all the washings from a winter slaughter house, fish shanty, hog pens, stables, etc., unites with it at right angles. This small sewer is quite shallow; is made of plank (so also is the main one) and only partially covered with earth; is seldom without water standing in it, as it has not a sufficient descent to carry off the water, unless there is an extra supply, as there was this winter. The distance from the head of the main sewer to the well is about twenty-five (25) rods, with from seven (7) to eight (8) feet descent to the level ground with the well; then about seven or eight feet in depth would reach a clay stratum of earth, upon which the water finds its way to supply the well. This well is out of a line with the sewer about eight feet; so you will perceive that the distance from the break in the sewer to the water in the well would be sixteen or seventeen feet.

My idea was, that the sewage after passing through the sand came in contact with the clay, which probably has an inclination towards the well, and conducted the foul water there. The ground was not frozen at the time. The sewer had given away a short time previous to any case of fever, and the water was passing into the sewer at the time of the first attack. My solution of the cases was, that the McDonald family, who used good pure water from another well, contracted the disease by inhalation, living at the very source of the poison; and the other cases from the use of impure water; and it would seem, too, that the water would be greatly purified by passing through so much earth.

After a few cases had occurred, the use of water from the infected well was discontinued, and not used again until quite a length of time after the epidemic had ceased, the sewer been repaired, and the well cleaned. No new cases occurred later than a week after the use of the water had been discontinued.

As regards the dates of attacks, I gave them as near as I could; they were so insidious in some of the cases it was difficult to fix upon the exact time.

Any further inquiry you may wish to make in regard to the epidemic, I shall be pleased to answer.

Yours with much esteem,

Port Sanilac, Mich., May 29, 1876. J. M. LOOP, M. D.

On receipt of the letter from Mr. Coppernoll, stating that many of those who used the water from the suspected source did not have the disease, a communication was addressed to him asking for a list of names and ages of all who used the water, specifying those who became sick. A blank was sent to him, and he kindly returned the list as requested. Since that time a copy of the list has been examined by Dr. Loop, and his comments are noted, in brackets, in the column of "Remarks," in the list, which is as follows:

To the Secretary of the State Board of Health:

SIR:—The following is a report relating to the Public Health in the Village of Port Sanilac, County of Sanilac, State of Michigan:

FULL NAMES OF PERSONS WHO USED WATER FROM ERSKINE'S WELL.	SEX.	Age in Years last Birthday.	REMARKS.
James Erskine	Male	52	[Was not living at home at the time of the outbreak of the fever and had not used water from the well spoken of for a month or more prior to the outbreak of the fever.—J. M. LOOP.]
Edward Erskine, Sr.	Male	54	
Mrs. Edward Erskine	Female	43	
Mrs. James Erskine	Female	43	
Miss Lizzie Erskine	Female	19	
Miss Ida Erskine	Female	17	Died January 7, 1876.
Edward Erskine, Jr.	Male	21	[Absent from home as above stated and did not use the water.—J. M. LOOP.]
Albert Erskine	Male	14	Sick same time as Ida. Since recovered.
Byron Erskine	Male	11	
John Eagle	Male	56	
Miss Celina Rich	Female	16	
James M. Hunter	Male	37	
Mrs James M. Hunter	Female	37	
Willard Hunter	Male	13	Sick for 12 weeks. Not fully recovered yet.
Burt Hunter	Male	10	Sick for 4 weeks.
Effie Hunter	Female	4	
Baby Hunter	Male	2	
Mrs. Hatton	Female	40*	Sick for 2 or 3 weeks. [I cannot say that she had genuine typhoid fever.—J. M. LOOP.]
Frank Hatton	Male	12	Sick for some 8 or 10 weeks. Recovered.
Edith Hatton	Female	8	Died. [Oct. 27th, of scarlatina.—J. M. LOOP.]
Kate Hatton	Female	6	Sickness of 2 or 3 weeks, but recovered.
Richard Hunter	Male	24	
Julia Hunter	Female	21	
Baby Hunter	Female	3	
William Walker	Male	24	
Mrs. William Walker	Female	26	Sick for 6 weeks, finally recovered.
Charles Weaver	Male	30	[Did not attend the family.—J. M. L.]
Mrs. Chas. Weaver	Female	30	
Alfa Weaver	Male	6	All well. No Sick.
Baby Weaver	Female	1	
Andrew Hicky	Male	26	
Mrs. A. Hicky	Female	24	Sick some 4 weeks. Recovered. [Not typhoid.]
Nelson Hicky	Male	4	Sick for 3 weeks. [Typhoid.—J. M. LOOP.]
Louisa Peitte	Female	12	Sick for some time. [Typhoid.—J. M. LOOP.]
John Woods	Male	24	
Mrs. John Woods	Female	24	Sick for some time. [Doubtful.]

[*I believe the age is nearly 44.—J. M. LOOP.]

Concerning the first eleven in the foregoing list, Mr. Coppernoll remarks: "All belonging to the Erskine family and have used the water for the last twenty years, and only the one death."

To the foregoing, Dr. Loop, adds: "These, the daughter and grand-children of Mrs. Hatten, were living with her, and used water with her from the Erskine well:

Mrs. Eva Sherman, female, age 23, died of typhoid.

Al. Sherman, female, age 30 months, died of typhoid.

R. Sherman, female, age 18 months, typhoid,—recovered."

In order to estimate better the proportion of those taken sick among the whole number of persons who used the water, the following table has been constructed. The two persons that Dr. Loop notices as absent from home at the time, are not, in this table, included among the "persons that used the water."

Persons that used the Water from the Erskine Well: Number by periods of Age.					Persons that had Typhoid Fever: Number in Each Period of Age.				Per Cent. of Cases of Typhoid Fever to Number of Persons Using the Water.			
Sex.	All Ages.	Under 40.	Under 30.	15 to 30.	All Ages.	Under 40.	Under 30.	15 to 30.	All Ages.	Under 40.	Under 30.	15 to 30.
Both sexes.....	37	32	28	12	14	13	13	4	37.84	40.63	46.43	33.33
Males.....	16	14	12	4	5	5	5	0	31.25	35.71	41.66	
Females.....	21	18	16	8	9	8	8	4	42.86	44.44	50.00	50.00

It is a common belief that persons in early or middle life are most liable to contract typhoid fever. So far as these few cases would indicate, if the water was known to have been contaminated, this view is not contradicted, as the proportion was greatest among those aged under thirty years. Nearly half of those under thirty years of age that used the water were taken sick. On the other hand, three cases of the disease are reported by Dr. Loop in the McDonald family that did not use the water, although, in the opinion of Dr. Loop, subjected to the exhalations from the same sewer that is supposed to have supplied the contaminating matter to the Erskine well. It is proper to remember that Dr. Garlick wrote that "the disease was not confined to one locality. I had several cases some distance from the neighborhood of Mr. Erskine's well;" but, when asked to name them, he has not sent in any list, or a statement that the cases were genuine typhoid fever.

All the cases of sickness reported, excepting one, were under forty years of age; indeed, with the single exception, they were all under thirty years of age. The statements of the ages in the different lists do not agree exactly. As regards the one reported aged forty in one list, and forty-four in the other, Dr. Loop writes that he thinks the age is nearly forty-four, but he "cannot say that she had genuine typhoid fever." He continues as follows:

All the other cases mentioned in my former statement had all the characteristics of true typhoid fever: bronchial cough, tenderness in the right illiac region, and rose colored spots were observed in most of the cases, more especially the first cases, because they were more closely looked for. I did not then, neither do I now, entertain any doubt of the true character of the fever.

J. M. LOOP.

Dr. Loop also communicated the following facts, as they were supposed by some person possibly to have a bearing upon the subject:

In the early part of September, prior to the outbreak of the fever under consideration, we had scarlatina of quite a severe form; and it spread pretty generally over the village, and many cases near around, through the country. It originated in a little girl about three years of age, daughter of ——— ———, who had recently located in our place from somewhere near Flint. This was a very malignant type of fever, but finally recovered. There were still cases of scarlatina at the outbreak of the typhoid fever.

An acquaintance of mine (a Canadian) was relating to me a short time since, a similar occurrence of typhoid fever of a very malignant type, from which few recovered, following, in quick succession, scarlatina. I have never met with a coincidence of the kind.

Respectfully,
J. M. LOOP.

In the summer, Dr. Loop added the following cases to those previously reported by him, there being no connection between the two sets of cases, however, according to his view of the subject.

Secretary of the State Board of Health:

DEAR SIR:—I have just been called three miles in the country to see three cases of typhoid fever in a family quite ignorant of the cause of this type of fever. Two of these cases have been running about one week; the other just taken his bed; all male subjects of the respective ages of five, seven and seventeen. Living on good high dry land, using *good* well water.

On looking about and inquiring into the cause of the fever, I found a most offensive swill-barrel standing in the back kitchen corner, five or six feet from a cooking stove in constant use. The barrel had been there all winter, and had not been entirely empty during this whole time. This emitted a very offensive smell. I speak of these cases, with regard to the probable cause, showing that, in my opinion, a person may use good pure water, and live in a healthy locality, and still, by a constant inhalation of such foul air, contract this type of fever.

Respectfully,
Port Sanilac, June 5, 1876. J. M. LOOP.

It would be easy to offer comments, and to introduce other considerations relating to this subject, but the present purpose is only to place on record the facts so far as learned concerning this outbreak. It is not claimed that the source and cause of the outbreak is positively shown beyond any question whatever. Possibly some essential facts not included herein may be brought out hereafter in consequence of the publication of these. By the collection of the facts concerning such outbreaks it is expected that we shall eventually be able to foretell, and consequently to make it possible to avoid the conditions which, if not avoided, will cause this dangerous disease.

AN OUTBREAK OF TYPHOID FEVER IN THE TOWNSHIP OF CANNON, KENT COUNTY, MICHIGAN.

In the report of the clerk of the township of Cannon, Kent county, for the quarter ending December 31, 1875, ten cases of typhoid fever were reported. A letter of inquiry addressed to the health officer of that township elicited the correspondence following:

H. B. BAKER, M. D., *Secretary of the State Board of Health:*

DEAR SIR:—In our report there were ten cases of typhoid: Miss E. M., taken sick at Grand Rapids and brought home, twenty-two years old, fever ran twenty-eight days; Miss M. M., age twenty, fever ran twenty-one days; Mr. W. M., aged 18 years, fever ran twenty-one days. The above are all members of one family. Mr. Tate, age forty, fever ran twenty-eight days. These four cases live in the edge of the town of Grattan, in the immediate vicinity of Malone lake. Said lake was drained and lowered about

six feet during the summer, exposing about sixty acres of muck land formerly covered by water. Mrs. Malone, aged forty-eight, mother of eight children, fever ran twenty-one days; Miss M. A. Malone, aged twenty, fever twenty-one days; Willie Malone, aged 14, fever fourteen days. All of one family, live in Cannon, and near said lake. Miss M. Lester, aged eighteen, fever twenty-eight days; Mary Joyce, aged fifteen, fever twenty-one days. These two cases live in this village just by the side of mill race. Mill floom gave way the last of September, and the race was dry until some time in October. Wm. Murphy, aged twenty-two, lived in town of Ada. As near as I could learn he was sick of billous-remittent for three weeks, no doctor called. Typhoid set in and ran a very rapid course. He died on the evening of the seventh day. Miss Julia Farrel, aged sixteen, fever twenty-one days. These two cases lived in the immediate vicinity of Chase lake. Said lake had been lowered three feet, exposing forty acres of muck. I have been here thirteen years, have been in active practice all the time, and have had only two cases of typhoid per year up to last fall. The above cases were all Irish, but not of the filthy kind. I overlooked one case in my first report. Hoping this may solve the mystery of there being so many cases in this vicinity,

I am, sir, very respectfully yours,

Cannonsburg, April 24, 1876. C. L. CHAMBERLIN, M. D.

It being desirable to have the cases stated in the order of occurrence, with the date of first sickness and of its termination, a blank was sent to Dr. Chamberlain, and promptly returned by him filled out and accompanied by a letter of explanation as follows:

To the Secretary of the State Board of Health:

SIR:—The following is a report of cases of typhoid fever which have occurred in the township of Cannon, county of Kent, State of Michigan:

No.	Full Name of Patient.	Sex.	Age in Years last Birthday.	Taken Sick.			Whether Died, Living or Recovered.	Date of Death or Recovery.		
				Month.	Day.	Year.		Month.	Day.	Year.
1	Mary Lester	Female..	18	Sept.	30	1875	Recovered	Oct.	28	1875
2	Mamie Joyce	Female..	14	Oct.	10	"	"	"	24	"
3	Ella Malone	Female..	22	"	15	"	"	Nov.	13	"
4	Maggie Malone	Female..	20	"	21	"	"	"	12	"
5	Wm. Murphy	Male	21	"	24	"	Died.	Oct.	9	"
6	Wm. Malone	Male	18	"	25	"	Recovered	Nov.	9	"
7	Mary Ann Malone	Female..	20	"	25	"	"	"	16	"
8	Mrs. Patrick Malone	Female..	48	Nov.	2	"	"	"	30	"
9	Willie Malone	Male	15	Dec.	2	"	"	Dec.	17	"
10	Julia Farrel	Female..	16	"	1	"	"	"	22	"
11	Mr. Tate	Male	44	"	17	"	"	Jan.	8	"

MR. H. B. BAKER, *Secretary of the State Board of Health, Lansing, Mich.:*

DEAR SIR:—In making out this report of typhoid cases I have consulted my journal carefully, also the families who were sick.

In my former report there might have been a little discrepancy in the age of patients and duration of sickness, as I made it from memory. In fixing the dates of this report I have stated the time or date when taken sick, also the date when the fever broke. Of course these patients were not well till some time after, but all made a good recovery except Mr. Murphy. Ella, Maggie, and Wm. Malone were of the family of Thomas Malone. Mary Ann, Willie, and Mrs. Malone were of the family of Patrick Malone. Thomas Malone took drinking water from a good well; privy eight rods from well and five or six from house. Patrick M. took water from a natural spring, cold and pure. No privy. Possibly the five cases in the Malone families might have been taken from the first, as they were all together frequently; but I give it as my opinion that the cause was the effluvia from decaying vegetable matter.

Respectfully yours,

Cannonsburg, April 29, 1876. C. L. CHAMBERLIN, M. D.,
Health Officer.

AN OUTBREAK OF TYPHOID FEVER IN MIDDLE BRANCH, OSCEOLA COUNTY, MICHIGAN.

In his annual report for the year ending September 30, 1875, the clerk of the local board of health for the township of Middle Branch, Osceola county, reported ten cases of typhoid fever, and accompanied his report with a letter, as follows:

MIDDLE BRANCH, OSCEOLA CO., November 25, 1875.

Secretary of the State Board of Health:

DEAR SIR:—This is a new township, composed of 19 and 20 north, 7 west. There is only about one hundred inhabitants, scattered over the two [surveyed] towns. There never has been any sickness, to speak of, until this fall; and there has not been any records kept of when they were taken sick. Two have died. All the rest are well or getting better.

I remain,

AHIRA CHAPIN,
Township Clerk.

There being a probability that these were the first cases of typhoid fever in that new locality, it seemed a favorable opportunity for studying its origin and spread. Accordingly a letter was addressed to him and is here inserted in explanation of some sentences in the reply thereto. It was as follows:

OFFICE OF THE SECRETARY MICHIGAN STATE BOARD OF HEALTH, *Lansing, Dec. 17, 1875.*

Ahira Chapin, Esq., Clerk of Middle Branch, Osceola Co.:

DEAR SIR:—In your Report to this Board, as Clerk of your township, you give the number of cases of typhoid fever as 10, and in your letter you mention that there are only about one hundred inhabitants in the township. This makes such an extraordinarily large proportion of cases of sickness from typhoid fever, that it is very desirable that this Office be in possession of a more detailed account of the cases. Will you have the kindness to give me more specific facts concerning the cases, particularly the first one, stating the age and sex, whether the disease was contracted at home or abroad, and whether it may have been produced by drinking water containing decomposing organic matter. Please give details of source of drinking water, such as to the relative positions of the house, well and privy at the home of the first patient; and, if the disease was contracted away from home, state whether the patient may there have drank impure water. Also please give more facts as to how the disease spread. What is the name and post-office address of the physician who attended these patients? If you cannot state facts positively, please give as good opinions as you can form.

Very respectfully,

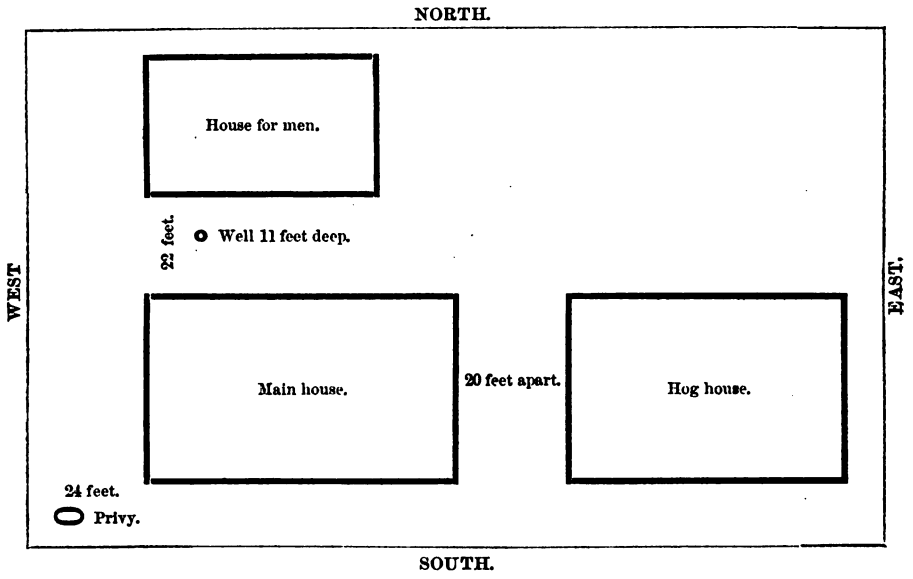
HENRY B. BAKER,
Secretary.

To this letter, Mr. Chapin replied as follows:

HENRY B. BAKER, M. D., *Secretary of the State Board of Health:*

DEAR SIR:—I will answer your questions as well as I can from facts obtained. James Watson was the first case of typhoid fever. He was taken sick about August 20. His business was lumbering. He had been in the woods looking pine lands, and at Muskegon and Chicago for the last two or three weeks before he was taken sick. He came from Chicago the last place. He was 39 years old, and was considered one of the toughest men in this part of the country. Arthur Duffy, Charles More, and two Curtis brothers were taken out to Evart. Thomas Duwair, Sarah Watson, and Ettie Watson, all the above cases were at the Watson farm. Before and at the time they were sick they only got a small part of the water they used at the well at the house; it was nearly dried up. The rest they got at a well dug to water stock at; it was about 12 feet deep. The water at both wells was bad tasting. Mrs. Watson said her husband told her that he had drank water when he was in the woods that was stand-

ing in ponds that was covered with a green scum. Inclosed is a draft of the Watson house and out-buildings:



It is about 60 feet between privy and well; the ground the privy stands on is considerably lower than at the well.

Ida Hurd, Albert Ellis, Evalina Ellis, and Alice Hurd. The above cases occurred at the house of James Ellis, distant one and one-half miles from the Watson farm. He and his wife had been at Watson's while he was sick. Mrs. Ellis died after one week's illness. After his wife died he removed to Clare county, where Albert died, and one other of his children was taken sick and died there. Ellis got water from what he called a spring. Those acquainted with the lay of the land, think it was nothing but surface water, for it tasted bad in warm weather.

Miss Mackintosh, Mrs. Mackintosh, Jack Welch and William Roper were taken sick at Watson's camp. Miss Mackintosh was the first case at the camp. Mrs. Mackintosh was the next. They had come from outside—do not know where. The girl got well. When Mrs. Mackintosh was taken sick they went away; have not heard from her since. Jack Welch was taken to Clam Lake. The last I heard was that the doctor had given him up. William Roper recovered. Men at the camp say that the water is good, and no chance for anything to get into it from the stables, or to make it bad from any other cause. I remain very respectfully,

MIDDLE BRANCH, Jan. 18, 1876. AHIRA CHAPIN,
Clerk of Township of Middle Branch.

To the Secretary of the State Board of Health:

SIR:—The following is a report of cases of typhoid fever which have occurred in the township of Middle Branch, county of Osceola, State of Michigan:

RECORD NUMBER.	FULL NAME OF PATIENT.	Sex.	Age in Years Last Birthday.	TAKEN SICK.			WHETHER DIED, LIVING, OR RECOVERED.	DATE OF DEATH OR RECOVERY.		
				Month.	Day.	Year.		M'th.	Day.	Year.
1	James Watson	Male.	39	Aug.	20	1875	Died	Sept.	21	1875
2	Arthur Duffey	"		Oct.	17	1875	Recovered	Oct.	24	1875
3	Charles Moore	"		Oct.	12	1875	"	"	30	1875
4	—— Curtis	"		Sept.	18	1875	"	"	20	1875
5	—— Curtis	"		"	20	1875	"	"	16	1875
6	Thomas Duware	"		Oct.	12	1875	"	Dec.	10	1875
7	Sarah Watson	Fem.	8	Nov.	12	1875	"	"	18	1875
8	Ettie Watson	"	6	Oct.	10	1875	"	Nov.	15	1875
9	Mrs. Evalina Ellis	"	24	Nov.	18	1875	Died	------	------	------
10	Ida Hurd	"	11	Dec.	1	1875	Recovered	------	----	------
11	Alice Hurd	"	10	"	5	1875	"	Jan.	1	1876
12	Miss Mackintosh	"	14	Sept.	6	1875	"	------	------	1875
13	Mrs. Mackintosh	"		"	10	1875	Don't know	------	------	1875
14	Jack Welch	Male.		"	12	1875	" "	------	------	1875
15	William Roper	"	23	"	18	1875	Recovered	------	------	1875
16	Albert Ellis	"	1	Oct.	15	1875	Died	Dec.	1	1875

The persons who furnished the facts for this record were: For Nos. 1, 4, 5, 12, 13, 14, 15, and 16, Mrs. James Watson; for Nos. 2 and 3, Mrs. Bain; for Nos. 6 and 7, Mrs. Hurd; for Nos. 8, 9, 10, and 11, William Roper. The postoffice address of each of these persons is Evart, Osceola county, Michigan.

I hereby certify that the above report of cases of diseases dangerous to the public health is a correct transcript from the records of this office.

MIDDLE BRANCH, January 18, 1876. AHIRA CHAPIN, *Town Clerk.*

In the foregoing report the cases are arranged in the order in which they were recorded, and not in order of occurrence. It will be seen that Mr. James Watson was the one first taken sick. It is stated that he had recently returned from Muskegon, and from Chicago, and as the disease seemed to begin with him and spread throughout the household, it is quite possible, to say the least, that the "germs" of the disease were by him brought from abroad. The second case was that of Miss Mackintosh. To some questions on the subject, the clerk of the local board of health replied as follows:

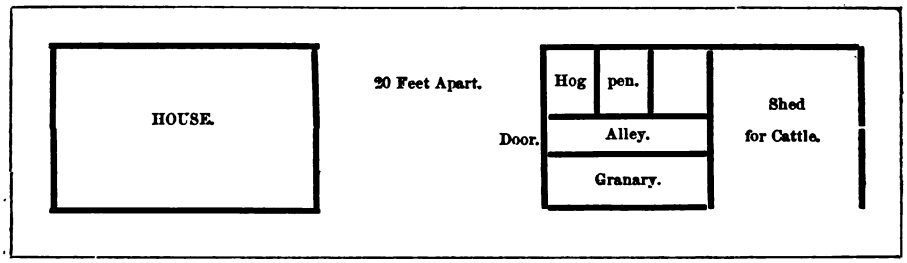
HENRY B. BAKER, M. D., *Secretary of the State Board of Health:*

DEAR SIR:—Arthur Duffey, Charles Moore, and the two Curtises were taken sick at Watson's farm, and then were removed to Evart.

As to Miss Mackintosh, I believe she was at Watson's house while he was sick, before going to camp, but a good many things were taken from the farm to the camp while he was sick, and men that had been at the farm to work went to the camp. It is about four miles from the farm to the camp. As to the number of men who occupied the men's house, I cannot say just the number, but they had from ten to twenty men to work all the fall.

The soil is what is called a clay loom; the surface of the land is slightly rolling; the low places have been ditched, so there is no surface water standing.

The milk was supplied by three cows at the farm; do not know where they were watered, but suppose at the well where the family got most of their supply from. At the camp they had no milk. As to the hog house, I will draw a plan of it as near as I can:



The number of hogs was from six to ten. There is a floor in the pen. They keep from 30 to 40 hens, and they roost over the hog pen and granary.

I remain very respectfully,

AHIRA CHAPIN,
Town Clerk.

MIDDLE BRANCH, Feb. 6, 1876.

In reply to the question, the clerk of the local board of health stated that the physician who attended Mr. Watson, and some of the other cases, was D. L. Dumon, M. D., of Evart, Osceola county. The following statement has been received from Dr. Dumon:

EVART, OSCEOLA CO., MICH., Feb. 11, 1876.

DR. H. B. BAKER, *Secretary of the State Board of Health:*

DEAR SIR:—Your letter of February 4th is at hand, contents noted, and I will gladly give all information I possess. On September 5th last, I was called to visit James Watson, of Middle Branch, in this county. I found him suffering from what I diagnosed as typhoid fever. He had been sick at this time some two weeks. His case was well marked. The next day after I visited him I inspected the premises and found the surroundings not what would be desired. They lived some twenty-five miles from this village, on a tract of land known as the windfall (some twenty years ago a tornado swept through that portion of the State from lake to lake, about two miles wide, uprooting all the timber; fires got in afterward, burning the timber, leaving it clear, or nearly so), and have some two hundred acres under improvement; they were also extensively engaged in lumbering. The house, which stood in the center of the farm (no trees or shrubs of any kind surrounding it), was built of cedar logs, one and a half stories high and about 20x26 feet. This was divided below in this wise, the house standing east and west: In the west end was a partition running across cutting off about 12 feet, making a room 12x20 feet; this was again divided unequally by another partition in two rooms. These rooms were occupied by James Watson, his wife and four children being in the smaller; William Watson, his wife and four children and a hired girl occupying the larger one as sleeping rooms. The east end of the house was partitioned off for about four feet for a cellarway and stairway. The center room was used for cooking in and setting the table. The chamber floor was made of unplaned boards closely fitted together. On this floor was placed beds composed of straw-ticks and soldier blankets, lying in two rows with an alley between them. In these beds slept about thirty men, and sometimes more, as they used their house as a stopping place for their men going to and from their camps. Just north of, and connected with the house, was a shed or stoop enclosed with boards placed upright, and no floor; in the east end there was a window hole, and just on the outside set several barrels of refuse from cooking,—bread, meat, milk, dishwater etc. Twenty feet east of this and the house stood the hog pen, made of cedar logs roofed over, and kept tight, in which were about twenty hogs, in the most filthy condition possible; thirty feet north from the house stood a storehouse where was kept harness, cant-hooks, bags, flour, feed, kerosene, etc., and between this and the house was located the well, which *never furnished good* water. On the west side of the house stood the privy, and on the south the barn (a log barn) and a blacksmith shop.

These buildings were all on a little rise of ground,—perhaps ten feet above the surrounding country; the land was a heavy clay soil, and in wet times is almost impassable; there is not a good cup of water in that locality; it seems to be surface water, no wells being more than ten feet deep, and many not more than five.

I immediately set the men at work to clear away and improve the hygienic condi-

tion, turning hogs loose, cleaning and purifying the pen by a profuse application of chloride of lime, privy cleaned, contents buried, and lime used freely; well cleaned out, and all done that I could to prevent over crowding. Those that were just coming down I had brought to the village, the men sent to camps, and in fact everything which my reason and experience could suggest was done to improve the surroundings.

I think the onset of the epidemic was directly traceable to over crowding, lack of ventilation, and exposure to decomposing organic matter. The case of James Watson was rendered more severe, probably, by having his physical and mental system overtaxed by work. He had taken a job of putting fifty million feet of logs in the river; seventeen million was to be put in this winter, which would employ two to three hundred men and from one to two hundred teams, the most of the labor of managing and directing falling on him.

He died from perforation of bowels after convalescence seemed established; I think from over eating. I had discharged him, so do not know for certain. There were no other fatal cases under my care. There were some other deaths, but they were treated by an irregular practitioner, and do not know whether they were typhoid or not. Thirteen cases in all came under my care, in all of which the enteric symptoms were well marked; some of the cases being typical cases of typho-enteritis.

Any further information that I can give will be cheerfully given.

Evart, Mich. D. L. DUMON, M. D.

TYPHOID FEVER IN ONE HOUSE IN WEESAW, BERRIEN COUNTY, MICHIGAN.

The health officer of the township of Weesaw, Berrien county, reported what he terms an "infected house," in which no family has lived but typhoid fever has returned and taken "each time its victim to eternity." The subject was referred to Dr. Hazlewood, committee on endemic diseases, etc., for investigation, but the papers were lost in the mails. Since that time another communication has been received from the health officer, stating that four deaths from typhoid fever have occurred in the house, as follows:

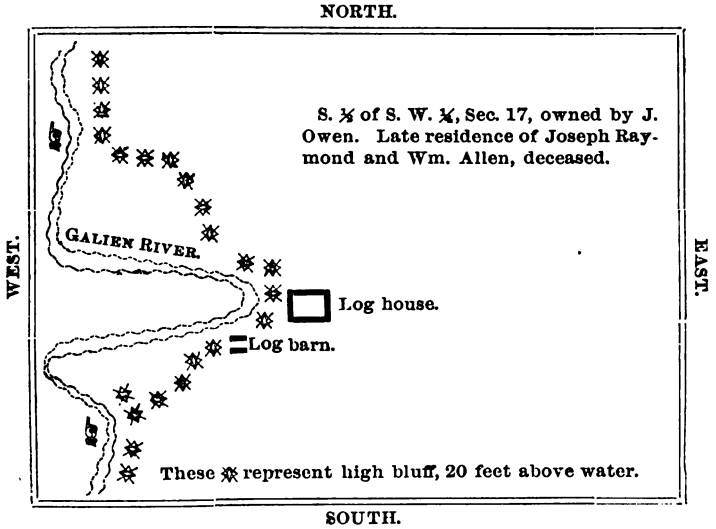
Wm. Raymond, died April 10, 1874.

Joseph Raymond, died June 13, 1874.

William Allen, died Februry 26, 1876.

Mary Allen (wife of Wm. Allen), died March 4, 1876.

"These persons used river water. They used the log barn [shown in diagram] as a privy. The stench, most intolerable, passed over the shanty where all lived and slept; the west winds brought over them the malaria from the river bottoms."



"The map of said premises is rough, but I thought you could get a better idea of the case thereby than by a lengthy paper."

"I attribute the whole thing to bad water, bad management, and filth."

Yours truly,

C. H. BOSTICK, M. D.
Health Officer for Weesaw, Berrien Co., Mich.

AN OUTBREAK OF TYPHOID FEVER IN THE TOWNSHIP OF DEERFIELD, LENAWEE COUNTY, MICHIGAN.

In a conversation with the Secretary of this Board, Hal C. Wyman, M. D., of Blissfield, mentioned the occurrence of several cases of typhoid fever which could be traced to no other source than to the use of water from a well contaminated by the decomposing organic matter of a dead turtle. Without attempting a discussion of the question of the manner in which such decomposing organic matter may have directly or indirectly led to the outbreak, Dr. Wyman has kindly written out a statement of the facts, as follows:

JUNE 22d, 1874.

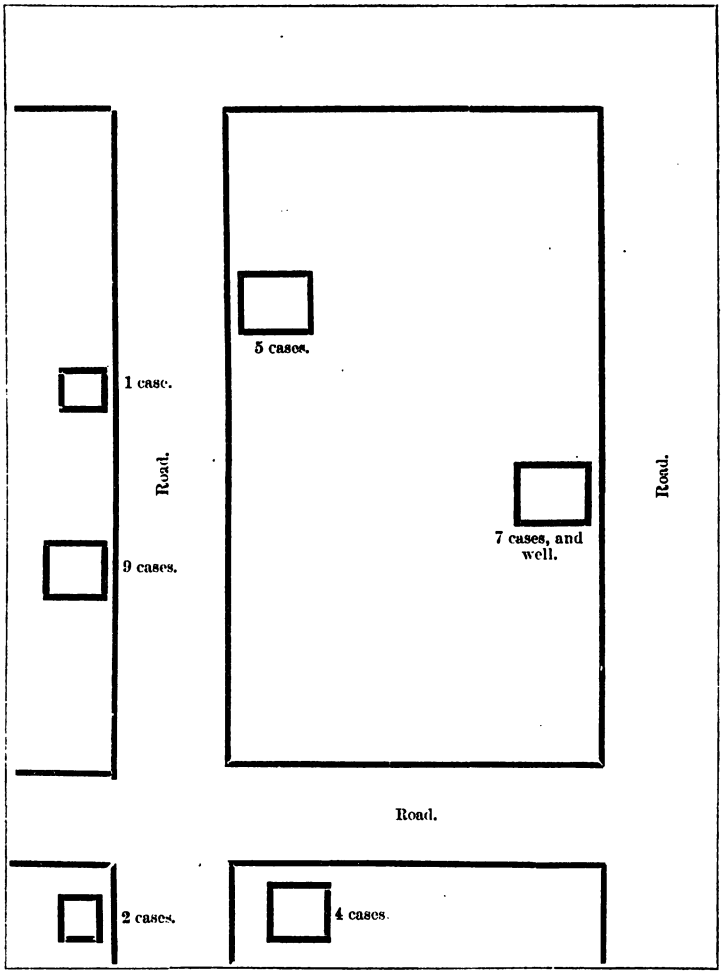
HENRY B. BAKER, *Secretary of the State Board of Health:*

DEAR DOCTOR:—In accordance with agreement, I submit to your attention the following account of the epidemic of typhoid fever, which prevailed in the township of Deerfield, county of Lenawee, during the months of January and February, 1874. Any person who has attempted to unravel the history of an epidemic several months after its victims have been dead or restored to health, knows very well the many difficulties which embarrass the investigator while making the *many inquiries* which are the *sine qua non* in the study of the causes of epidemics. I have visited every family where the disease prevailed, and endeavored to elicit from them nothing but facts. This, one may think, is a very simple and easy thing to do, but let him encounter the crude hypotheses and impulsive speculations which the people are much more ready to furnish than answers to your questions, and he will speedily decide that a thorough study of an epidemic requires much tact and perseverance. In the family of Antony Patch, a German, who has lived in this place for ten years, typhoid fever first made its appearance in January, 1874. Every member of his family, consisting of seven persons, was taken, and all about the same time. The cases ran a very violent course, and six of them died after a sickness of four to five weeks. An examination of the premises showed everything to be in unexceptionable hygienic condition. But on further inquiry I found that when the well was cleaned out this spring, the remains of a large turtle in a state of putrefactive decomposition were found in it; and since all other families where the disease prevailed had more or less intercourse with the Patches, we must conclude that the foul water was an important factor in the production of the disease.

Mrs. Forkey, a German neighbor, visited, and assisted in the care of the Patches. After a time she sickened and went home; and soon, but just how soon I have been unable to learn, every member of her family, consisting of nine persons, was down with the disease. The eldest daughter, aged 18 years, was much worse than any of the others, brain symptoms being very prominent; she died on the fifth day after her attack. All the Forkeys, with this exception, recovered. About their house every pains was taken to keep things in a neat and clean condition. Their nearest neighbors, a French family of five persons, were about the same time attacked with the fever. They lived in the most squalid manner, and four of them died. A woman who lived on the opposite side of the road from the Frenchman was taken sick and carefully cared for by her husband. She recovered after an illness of five weeks. Two other families in the vicinity were attacked. Six cases occurred in them, four in one and two in the other, but all recovered after a severe illness of four to five weeks. All these cases occurred within three-quarters of a mile of the residence of Mr. Patch, where the fever first appeared, and ran its most violent course. No cases ever occurred on the same tract before; but last fall the fever prevailed in a family living about two miles distant. The dwellings of those who suffered from the disease were of the same style as those used by country people where the disease has not existed. Nothing could be discovered in the domestic management of the households that could be capable of increasing the liability to the disease; of course excepting the well of Mr.

Patch. The section of country is, however, low and marshy; the water, for a considerable distance west of it, runs down upon it and there remains until evaporated. The dwellings, however, are not located in the swamp, but upon natural sandy eminences which are from two to four feet higher than the marsh. The clearing of the land, which was originally covered with heavy timber, has all been done within the past ten years. The highest point on the tract cannot be over 20 feet above the bottom of the River Raisin.

DIAGRAM OF LOCALITY OF OUTBREAK OF TYPHOID FEVER.



Since sending the foregoing, Dr. Wyman has replied to question as to the character of the disease, as follows:

The cases were what practitioners call typhoid (in a comprehensive sense), and as I saw only a part of the cases and had much hard work on my hands, I could not now give from memory a very careful analysis or description of the symptoms. Since my return from Europe I have seen several cases on the same ground (none fatal) that were, judging from commencement, duration, eruption, and delirium, more nearly

allied to typhus than to our twenty-one day cycle-observing typhoid. Let me hear from you again, and if I can be of any further service to you will cheerfully give it.

Yours, etc.,

Blissfield, Mich., Feb. 12, 1876. HAL C. WYMAN.

In England, not long since, a medical man reported an outbreak of typhoid fever which he attributed to the use of water from a well into which a quantity of turnips had been thrown, and which had to some extent undergone decomposition. The view that the disease was sometimes caused by drinking water contaminated with organic matter of vegetable origin, had been quite strongly criticised in the *Sanitary Record,* in which a case had been reported by this same person, and in reply, this outbreak was cited as proof that the disease could be produced in that manner. This outbreak was "in a little hamlet having a population of about 200, elevated above the sea level 600 feet, on the millstone grit. Ten cases of typhoid fever occurred in one week, where no fever had been, to to my own knowledge, for the last three years. I made every investigation at the time, endeavoring to trace the outbreak to some source of contagion, but failed." "It happened, however, during the canvalescent stage of those cases that recovered, that while water was being drawn from one of the wells in the place, a turnip almost devoid of its leaves came up in the bucket, consequently the well was thoroughly examined, and no less than twenty of these roots were found in it. The well was about twenty-five feet deep, four in diameter, and contained ten feet of water at the time." "In every house where the water from this well was used the fever appeared, and in no other, and when the well was cleaned out, water and all, it immediately disappeared from the village. Of course isolation and disinfection, with other precautions, were recommended and adopted during this outbreak in every infected house." *

It may be found that the idea that typhoid fever can only be conveyed by the excretions of persons sick with the disease, will have to be so far modified as to include the idea that the contagium is capable of reproduction, not only in the human organism, but also outside the body in decomposing organic matter having certain constituents, whether derived from the animal or the vegetable kingdom.

"Enteric [typhoid] fever has, we believe, been regarded by all pathologists to be due to a specific poison. Dr. Budd, Professor Biermer, and others, have, from their own investigations, discovered beyond doubt that the contagion of enteric fever is due to a specific and living organism, which, when transmitted from a diseased to a healthy individual, produces a similar disease. It is now also pretty fully established that these organisms or germs, if we may so call them, are introduced into the system through the media of the air in breathing, in food, or in drink; and that the ejecta of the infected person is the chief vehicle of the poison. It has been observed by Liebermeister, Dr. Murchison, and others, that the contagium thus contained does not produce infection in the healthy individual immediately, but that it lies inactive, or in a latent state of development, for some time, or strictly, perhaps, in a state of incubation. During this period the germs remain in the intestine, where they develop towards an active condition. Dr. Klein's researches, published in his report on this subject to the 'Lords of the Council on Scientific Investigations in aid of Pathology and medicine,' establish clearly this theory of the contagium of enteric fever, and that contagium is organized, and has to go through a state of

* Angus Mackintosh, M. D., Medical Officer of Health, Chesterfield, Jan. 24, 1876, in *Sanitary Record,* London, England, January 29, 1876.

incubation." * * "Dr. Klein's report has established the opinion that the contagium of enteric fever is a microphyte or visible germ, which is capable of multiplication. It also indicates that these microscopic forms are of a low vegetable life, and are found in swarms in the intestines and bowel-discharges of the sick, penetrating through the whole system, and that to the latter we must look for the 'possible germs of epidemic infection.' The experiments detailed prove clearly, also, that the germs are of a specific organic type."*

A writer has lately asked, "How long will etiologists continue to resist the conclusion that the infective agent of typhoid is derived from a specific mildew occurring on fæcal matter?"† As before suggested, it may be found that this "specific mildew" is capable of reproduction in other organic matter than human excrement, and some of the evidence supplied by the regular correspondents and printed herewith, supports that view. In order to furnish a useful hint to those working at this subject in this State, it may be well to quote a little further from the last-mentioned writer. He says: "Most phytologists would, I think, infer from the description and from the drawings of the vegetation figured by Dr. Klein, that it is the water phase of the plant, and that by proper cultivation on the surface of a fit substrate, it would revert to its original or mildew form."

"It is highly probable that the gonidia and their descendants are the modified representatives of the sporules of some mould. Nothing is clearer than that most of these low terrestrial organisms will not only sustain themselves when they are accidentally immersed in fluids containing nitrogenous matters, but will multiply rapidly under the abnormal conditions, owing to the facility with which their organs of fructification will accommodate themselves to the new medium. It is, then, a warrantable scientific inference that the vegetation in the typhoid tissues is in a casual and degenerate stage of its existence, and that its true, or highest, or original form is that of a mildew growing on a free substrate. If this inference be verified experimentally, the key to the whole position will be obtained. With it the enquirer may see at once how the transition from an air-poison to a water-poison, or the converse, is effected; and with it Dr. Klein would have advanced the fungus he had made out a long way towards taking rank as the typhoid plant. Although other sets of observations must be undertaken to determine the issue raised, as well as to clear up other points too numerous to refer to, yet I confidently anticipate the verdict of the etiological world, and accept Dr. Klein's fungus as the specific cause of typhoid."

The foregoing may serve to briefly indicate to those not already familiar with the subject some of the views now held by physicians in different parts of the world, and may, perhaps, lead to more definite observations, and reports to this Board, of facts bearing on these important questions,—facts which can as well be observed in Michigan as in foreign countries, if only the necessary enthusiasm shall be aroused in those properly trained for observation in such studies.

This Fourth Annual Report is respectfully submitted.

HENRY B. BAKER,
Secretary.

* *Public Health*, London, England, June 16, 1876.
† "Mucor" of Melbourne, Victoria, in *Medical Times and Gazette*, London, Eng. Quoted in *Sanitary Journal*, Toronto, Ont., Oct., 1876.

ACHIEVEMENTS OF HYGIENIC SCIENCE AND ART;

THEIR ECONOMIC RELATIONS TO THE STATE;

MEANS FOR THEIR FURTHER PROMOTION:

THE THIRD ANNUAL ADDRESS

TO THE

STATE BOARD OF HEALTH, OF MICHIGAN,

BY

H. O. HITCHCOCK, M. D.,

PRESIDENT OF THE BOARD.

ACHIEVEMENTS OF HYGIENIC SCIENCE AND ART.

ON SOME OF THE ACHIEVEMENTS, ACTUAL AND POSSIBLE, OF HYGIENIC SCIENCE AND ART; THEIR ECONOMIC RELATIONS TO THE STATE, AND THE MEANS FOR THEIR ACCOMPLISHMENT.

Dr. Edward Jarvis, in a paper contributed to the State Board of Health of Massachusetts, on "Political Economy of Health," very concisely remarks that "*the effective power of a nation* is in the number of its people in the sustaining period" (*i. e.* between the ages of twenty and seventy), "and in the proportion these bear to the dependent classes."

"Collective personal gain is public gain, and aggregate personal loss is, to the same extent, the suffering of the community."

"The State thus has an interest not only in the prosperity, but also in the health and strength and effective power, of each one of its members."

Whatever has, in the history of the race, and especially in the history of civilization, tended to add to the efficient power of individuals of the various nations, is really embraced in Hygienic Science and Art. Theirs are the better adaptations of means, circumstances, and habits by which man's life has been expanded, and his strength increased; theirs the various improvements in agriculture, in vegetable and animal life, by which man has obtained better and more constant food; theirs, too, the wonderful and manifold improvements in the arts, by which man is better clothed and housed.

The gradual increase in the length of human life since the commencement of the Christian era is the result, and really marks the progress, of the benignant rule of the goddess *Hygea*.

In the third century the average duration of life among the most favored classes in ancient Rome was thirty years. In the present century the average longevity of persons of the same class is fifty years,—or an increase since the third century of 67 per cent. There can, I think, be no doubt that in the lower classes the increased longevity is still more striking.

"The records of life and death in Geneva, in Switzerland," says Dr. Jarvis, "for the last three hundred years, are more complete than any others now known."

"These show that the expectation of life from birth, or the average longevity was:

	YEARS.
In the 16th century	21.21
In the 17th century	25.67
In the 18th century	33.62
1801 to 1833	39.69
1814 to 1833	40.68

"In the 16th century, 25.92 per cent. of the children died in their first year. In the 19th century the deaths at this age were reduced to 15.12 per cent.

"In the 16th century, 61.11 per cent., and in the present century only 33 per cent., perished before they reached maturity at twenty.

"In the first period, 3.08 per cent. passed their three score and ten years, and in the latter 17.94 per cent. had that length of life.

"As large proportion now live to seventy as lived to forty-three three hundred years ago."

There was one death in 33 in England in 1690, and only one in 58 in 1821,—a decline of mortality of nearly 80 per cent. Dr. Beale, in his comments upon the report for the quarter ending December, 1857, of the Registrar-General of England says: "As an instance of the saving of life, which has been caused by the progress of civilization and of hygiene, we may mention London, the annual mortality of which, two centuries ago, was fifty per thousand, its inhabitants living only twenty years on an average. The yearly death-rate was:

	Per 1,000.
1660 to 1679	80
1681 to 1690	42.1
1746 to 1755	35.5
1846 to 1855	24.9
1871	22.6

"The annual rate is now only 24 per thousand and the mean duration of life 42 years. Even within the past few years a great decline has taken place in the death-rate of many places in England which have had the *benefit of sanitary improvements.*"

But even now the rate of mortality in some parts of England is 36 per 1,000, while in other districts it falls as low as 15 per 1,000, and it is believed that the difference is demonstrably due to preventable causes. Says the Registrar-General of England: "Experience furnishes us with a standard which can only be said to be too high; any deaths in a people exceeding *seventeen in a thousand* annually are *unnatural* deaths. If the people were shot, drowned, burnt, poisoned by strychnine, their deaths would not be more unnatural than the deaths wrought clandestinely by disease in excess of natural deaths,—that is in excess of seventeen deaths in one thousand living."

Thus it appears, that in Rome there has been added to the life of each person who dies among the most favored class, twenty years, and in London, twenty-two years. As these years must all be counted as in the "effective period," what is the economic significance of such increased longevity in such a State as Michigan? To say nothing of what is saved annually in the cost of sickness and the expense of burial, what is the actual value to the State of the number of years of effective labor thus saved?

In the published volume of vital statistics for this State for the year 1871, 9,728 deaths are reported as having occurred in the State during that year; but, as it is believed by the compiler that only 54 per cent. of the deaths in Michigan are reported, these figures must be multiplied by 1.86, so that we have 18,094 deaths as probably having occurred in the State in 1871.

If this number closely approximates the truth, the State may congratulate itself on having on the basis of the census of 1870, a mortality of less than fifteen to the thousand; whereas, had that degree of mortality prevailed in Michigan in 1871 which is said to have prevailed in London in 1871, the vital statistics should record for that year about 30,148 deaths.

POSSIBLE FUTURE ACHIEVEMENTS IN HYGIENE.

Let us now inquire what are some of the possible achievements of Hygienic Science and Art in the future, and the best means for their accomplishment.

One of the most promising fields of labor for the hygienist is, it seems to me, in the still further prevention of sickness and deaths from *miasmatic causes.*

Referring to our vital statistics for 1871, we learn that the probable number of deaths in the State, as corrected by the compiler, was 18,094, and that of these 4,832 or about 27 per cent., were believed to have been caused by miasmatic diseases. Certainly this number should be largely increased for there were reported as deaths from pneumonia 482; or, when "corrected" by multiplying by 1.86, 800. Of these we may add to our former number of deaths from miasmatic causes at least 500, as surely due to miasmatic causes as any others, and we have our list swelled to 5,332 from those causes in a single year.

As many persons can better appreciate the loss to the State by preventable deaths when the value of the years of "effective life" lost by them is put into dollars and cents, let us, for a moment try approximately to estimate the real money loss to the State by these miasmatic causes.

The last sickness of the 5,332 persons who die from these causes, including loss of time, must have cost on an average $50 for each person, and the funeral expenses must have been on an average $25 for each one, giving a cost—actually a loss—to the State of $399,900.

Now, as these causes of death are accounted by all hygienists as preventable, it is safe to say that a large number of these persons died prematurely. Let us suppose, then, that these persons died sooner than they otherwise would by an average of ten years, and that one-half of those years thus lost might be said to be years of "effective life."

The State then loses annually 26,660 years of "effective life," which cannot be estimated at less than $150 per year, giving a money loss of $3,999,000.

English observers and statisticians have estimated that for every death two persons are constantly sick.

Thus, for every death from the causes under consideration it is probable there are two years of sickness from the same causes in other persons in this State, or 10,664 years of sickness from miasmatic causes in the year 1871. Counting one-half of these years of sickness as in the "effective period" of life, we have their money value, at $150 per year, $799,800, which is really so much loss to the State.

Nor is this all; for the cost of these 10,664 years of sickness in medical attendance, nursing, and loss of time of parents and friends cannot be estimated at less than an average of $200 per year, thus entailing another loss to the State

of $2,132,800. Here, then, is the approximate money loss to the State from these preventable causes of sickness and death:

Sickness and funeral expenses of those dead from these causes, 5,332	$399,900
Loss of effective years of labor by these premature deaths, 26,660	3,999,000
Loss of effective years of labor from sickness of others, 5,332 years	799,800
Loss in cost of 10,664 years of sickness	2,132,800
Total loss to the State	$7,331,500

That probably one-half of all this loss may be saved to the State is, I think, apparent from the following and other considerations.

HOW TO REDUCE THE DEATH-RATE.

There are reported in the vital statistics for 1871, 75 deaths as having occurred from small pox; or, when corrected by multiplying by 1.86, 139 deaths.

Compulsory vaccination, carefully carried out by faithful and vigilant local boards of health in every city, village, and township of the State, together with more complete isolation of every case of variola and varioloid, under the present statutes of the State on this subject, would, without doubt, reduce the mortality from this cause to a very small per cent. of what it now is.

Can any one doubt that the same may be true in respect to the 696 (or, as corrected, 1,294) cases of death from scarlatina.

It seems a late day to point out the danger of its contagion, and the absolute necessity of complete isolation for the prevention of the spread of this disease so fearfully fatal among children. There has grown up a feeling in the public mind, as productive of evil as it is devoid of truth, that scarlatina is one of the inevitable children's diseases, and, although often extremely dangerous to life, it must be submitted to, and, on the whole, the sooner children have the disease the better. Lately, however, a more intelligent and consistent idea has begun to prevail, and it is the solemn and imperative duty of every hygienist, of every local board of health, and especially of every physician, to give the idea that *scarlatina is a dangerous, contagious, and almost wholly preventable disease*, the widest circulation and the profoundest reception possible. By this intelligent fear, and the vigilant guarding of children and adults from the contagion, and by the complete isolation of every case of scarlatina, by far fewer homes would be made desolate.

Is not here, too, a field in which some thoughtful and observant hygienist will yet achieve an immortality scarcely less grand than that of Jenner, and receive the thanks of millions of mothers yet unborn, who, otherwise will be "Rachels weeping for their children?"

Is it not possible, even probable, that some subtle but simple process analogous to vaccination may ere long rob scarlet fever of its terrible dread and snatch from its paralyzed hands its innocent victims?

If the same care of isolation, too, were used in cases of measles, diphtheria, and whooping-cough, the fatality from these diseases would be largely reduced. And what is true of these last named diseases is, for far stronger reasons, true of typhus and typhoid fevers. Let all public and private nuisances be abated, and all private and public rooms be well ventilated, and we shall have recorded but very few original cases of typhus or typhoid fevers; and let these few be strictly and completely isolated, and no others would follow.

A very wide field is open to hygienists, physicians, and boards of health, in which to save the lives of many persons now dying of malarial fevers, dysentery, diarrhœa, pneumonia, and consumption. The miasms of wet, undrained lands, which might, by well-planned draining, be made salubrious and productive, are now carrying, needlessly, to the grave hundreds of persons in this State every year.

The local board of health of every township in the State would be laying the foundation for a work of almost incalculable good to future generations if they would, year by year, point out and report the parts of their townships which need and are capable of draining, accompanying their reports with statistics of disease that could fairly be traced to the miasmatic influences of those districts. These reports, with the proper petition necessary to demand the action of the Commissioner, should be addressed to the County Drain Commissioner.

Besides earnest and continued efforts to make low, wet, and malarial districts salubrious, by means of judicious and effective draining, there is a line of inquiry open to boards of health to prove by actual experiment whether such districts, and those incapable of drainage, may be made to some degree dry and largely salubrious by the planting of certain trees more or less abundantly on those lands.

Is it possible that the *Eucalyptus globulus*, a native of Australia, but now largely cultivated in Europe, California, and some of the Southern States, may be cultivated even in Michigan?

This tree is believed to possess wonderful antiseptic properties, and the power, by the camphoraceous odor which it emits, to make salubrious wet lands which would otherwise be malarious or even pestilential.

Dr. Benjamin M. Cromwell, in a report on the "Influence of Trees on Health" to the State Board of Health of Georgia, thus speaks of several of these trees now growing in Albany, Georgia: "At night, when the air is calm, these trees emit the characteristic camphoraceous odor, so much commented upon by those who have described the eucalypti, and to which it is thought they owe their antiseptic properties. So decided is this odor, on passing in the vicinity of these little trees, that the writer can well understand how a forest of them could impregnate the air round them for miles with their pleasant odor, and that the stories told by travelers concerning it are within the bounds of a reasonable probability."

"The eucalypti have the power of drying low and marshy soils by the amount of evaporation given off by their leaves, for they are said to possess the wonderful capacity of dissipating in this manner ten times their weight of water, while the odorous emanations are in proportion to the amount of evaporation given off."

The growth of these trees is said to be surprisingly rapid, and they attain to very great height.

The London Medical Times, as quoted by Dr. Cromwell, gives some remarkable instances of the power of the eucalypti in improving the health of miasmatic localities.

"At Paddock, twenty miles from Algiers, a farm situated on the banks of the Hamyze, was noted for its extremely pestilential air. In the spring of 1867, about 13,000 of the eucalypti were planted there. In July of the same year, the time when the fever season used to set in, not a single case occurred; yet the trees were not more than nine feet high. Since then complete immunity from fever has been maintained."

"In the neighborhood of Constantine," says M. Gimbert in a report to the French Academy, "the farm of Ben Machidlyn was in equally bad repute. It was covered with marshes both in winter and summer. In five years the whole ground was dried up by 14,000 of these trees, and farmers and children enjoy excellent health."

Is it not worth while for this Board, as well as local boards of health, to practically demonstrate whether the *Eucalyptus globulus*, or any of the other species of this genus, can be made to grow well in this northern latitude, and thus to prove whether those trees may be made available to secure greater salubriousness to certain parts of Michigan now deemed unhealthy on account of miasms? Would not this be an appropriate experiment for the State Board of Health to institute on this Centennial year, thus carrying out the very patriotic suggestion of our worthy Governor by planting trees at once memorial and beneficent.

There is another wide field open for the investigation and the labors of the philanthropist, statesman, and hygienist. I refer to the influence upon the death-rate, the health, the general well-being of its citizens, and the economy of the State of the free sale and habitual use of alcoholic drinks.

In my annual address in 1874 I think it was shown to be probable that nearly, or quite, ten per cent. of the deaths, and an equal per cent. of the sickness, in the State was fairly chargable, either directly or remotely, to the abuse of alcoholic drinks; not that such a proportion of the deaths are so attributed in the vital statistics,—for in those tables many deaths really caused directly by the abuse of alcohol are assigned to other causes, considered *respectable*, while in a very large number of other cases, the power to resist disease of any and all kinds was so greatly reduced by the habitual use of ardent spirits that the lists of deaths from very many diseases were largely increased by this cause.

It is an interesting and a suggestive question, the solution, or even approximate solution, of which would be of great use to the State to determine what are the real losses to the State from the free sale and use of alcoholic liquors.

The proper consideration of this question would, on the one side of the equation, place the gains accruing from the traffic in ardent spirits, and on the other side the losses falling upon the State.

1st. From the cost of the last sickness and the death of those whose deaths may be fairly attributed to this cause.

2d. From the loss of years of effective labor from the premature deaths of those who die from this cause.

3d. From the cost of, and the loss of labor in sickness during the year, other than that which resulted in death; for it is believed that for one death two are constantly sick.

4th. The cost of maintenance of the number of insane and idiotic made so annually by the effects, direct or remote, of alcoholic drinks.

5th. The loss of effective years of life in those thus made insane or idiotic.

6th. The cost of arresting, convicting, and punishing criminals, made so directly or remotely by alcohol.

7th. The loss of effective labor caused by the abuse of alcohol, directly or remotely, in the punishment of criminals.

8th. The loss of property destroyed by accident or otherwise, directly traceable to the influence of alcohol.

9th. The loss from pauperism, directly attributed to the influence of alcohol.

10th. The money lost or squandered by individuals under the influence of alcohol.

11th. The loss of character, and the constantly increasing loss to the State of the physical, mental, and moral degeneracies, almost sure to be entailed by drunkards on their children; the loss of which to the State, as well as to families, is far more vital than the loss of money or lands.

The working out of this great problem is in the legitimate field of hygienic science.

Were it fairly wrought out, I am confident that it would be shown that the State would be an immense gainer if it could utterly and forever expel the traffic in ardent spirits from its borders, even at the cost of settling an annual pension upon all those engaged in the trade equal to their present net profits from the business.

VITAL STATISTICS THE BASIS OF PRACTICAL HYGIENE.

Let us now consider briefly what legitimate and appropriate means are most available for the successful accomplishment of the work of the hygienist in the fields already mentioned.

To any one giving careful thought to these subjects it must be apparent that the first and greatest desideratum here is *facts,—well authenticated and carefully compiled facts.*

Indeed, reliable vital statistics must of necessity be the basis for the work of intelligent and practical hygienic art.

It is well remarked in the Report of the State Board of Health of Georgia for 1875 that, "in all countries the registration of births and deaths, and the causes of the latter, is the foundation stone of health organizations, and in the course of time becomes the most powerful lever in their hands. We must know how many deaths occur, and the diseases which produced these deaths, and the localities, the atmospheric and telluric conditions which modify them, before we can act intelligently in the line of prevention.

Says an intelligent British author: "One of the first great objects of sanitary organization is to watch the death-rate; to watch it, not only over a city or parish, but in detail; to watch it with regard to difference of sex, age, and circumstances; to watch it from month to month, and even from week to week; to watch it as affected by different diseases, and particularly what are termed epidemic diseases, and such diseases as we believe to be, in a great degree, preventable; and this done, to make known the results from time to time to those who are chiefly concerned in sanitary evils, so as to effectually bring home to the dwellers in darkness, ignorance, and disease, the immense significance of the facts taught by these figures."

Buckle says that "statistics, as a branch of knowledge, though still in its infancy has already thrown more light upon the study of human nature than all the sciences put together."

One of the strongest and most persistent efforts of this Board should be to secure more complete and reliable vital statistics of the people of Michigan.

Our present manner of securing the statistics of marriages is, perhaps, when the law is well understood and thoroughly enforced, as practical and efficient as we may hope to have, for these statistics take their origin very properly with an official participant in each and every marriage.

As a marked improvement in these statistics is noticeable each year, we may

confidently expect that they will ere long be approximately accurate and fairly reliable as a basis of comparison and reasoning.

But when we consider our statistics of births and deaths, we notice that they do not take their origin with an active participant, or even an observer, of the events reported.

It is made by our law, the duty of the "supervisor or assessor between the tenth day of April and the first day of June to ascertain by actual inquiry or otherwise, of the inhabitants thereof, the births and deaths which have occurred in their respective townships, cities, or wards, during the year ending on the last day of the preceding December."

It seems to me it would be difficult to devise a manner of securing these statistics that would have in it more elements likely to lead to errors.

1st. The time during which these inquiries are to be made,—more than a year after many of the events have transpired,—would be pretty sure, either from forgetfulness or from change of location, to lead to a great number of omissions.

2d. These facts are to be ascertained "*by actual inquiry or otherwise,*" as the indolence, carelessness, or indifference of the officer may suggest as the easiest way to satisfy the State, which makes no provision for determining the faithfulness or punishing the unfaithfulness of those to whom it commits this duty. The fee paid for each recorded case is not sufficient of itself to induce great accuracy, nor are there any methods provided for proving the accuracy of these reports.

3d. The supervisor or assessor may fairly be presumed to be *not a physician,* and with no special qualifications for ascertaining exactly or recording with accuracy, of what disease any person may have died several months or a year before. He must take the statement of the family friends or neighbors; and how much reliance there is to be placed upon the memory of such persons as to the cause of a death that took place months before, any educated physician can understand who knows how his diagnosis of disease is, often at the time of making it, falsified or caricatured by ignorant and forgetful friends and meddling and prejudiced neighbors.

The result of this method of collecting these statistics we are not surprised at, when we are told by the compiler of the vital statistics for 1871 that not more than fifty-five per cent. of the actual deaths are believed to be reported. The same elements of error would lead us also to suppose that the causes of the reported deaths were no more reliable for their accuracy, unless "corrected" by some calculation.

Would it not be far more natural to make the statistics of births as far as possible, take origin with an active, interested participant in the event, and require of every physician or midwife attending any case of labor to make a record of all the facts desirable to be tabulated with the birth, and report the same to the supervisor or assessor, or some other suitable and designated person, within ten days after the birth?

In cases where no physician or midwife was in attendance, the same duty might be required of the father and mother of the child.

In the record of deaths, too, how much greater accuracy and exactness of classification might be secured, if every sexton or person officiating at a burial of any human corpse should be required, under suitable penalties for disobedience, to secure from the physician who attended the deceased person, his or her

certificate as to the cause of death, together with all the other facts desirable to be recorded with the death.

This statement of the sexton should be under oath as to the authenticity of the physician's certificate, and as to the correctness, so far as could be ascertained, of the other facts contained in it; and should, within ten days after the death, be placed in the hands of the supervisor or assessor, or some other suitable and designated person. These records of births and deaths should once in three months be reported by the supervisor or assessor to the county clerk, and by him, within one month after the close of the year, be forwarded to the Secretary of State.

A law requiring these statistics of births and deaths to be made in a manner similar to what I have described, made effective by suitable penalties properly enforced, would very soon furnish the Secretary of State with facts and figures in vital statistics, the intelligent and earnest study of which by this Board or by other hygienists, would lead to lessons of the greatest value to the citizens of the State.

IMPORTANCE OF EFFICIENT LOCAL BOARDS OF HEALTH.

In my annual address one year ago I took occasion to make some suggestions as to the necessity for, and the proper constitution of, local boards of health. I trust I shall be pardoned for, in some sense, repeating some of the ideas which I then urged.

The more I reflect upon it, the more does it appear to me that in the very general organization of local boards of health, and their proper constitution, are we to find some of our greatest aids, not only in the study of what needs to be done in the line of hygienic improvements, but in practically securing the benefits of these improvements to the people.

Ought not this Board to labor even more earnestly than it has to secure the establishment of an efficient Board of Health in every city, village, and township of the State?

Is it not possible to secure either by election or appointment, independently of political partisanship, the most suitable persons for such a position? At least, is it not possible for us to secure the enactment of a law that shall *require* that in every city, village, and township a well educated, efficient physician be made, either by election or appointment, the health officer of the city, village, or township, and as such the executive officer of the local board of health? The law providing for such an officer should point out, at least in outline, his duties, and should fix a fairly adequate salary, and should name suitable penalties for the non-fulfillment of those duties. Would it not be well that, among other duties, he should receive the statistics of births and deaths, and, perhaps, marriages, and that once in three months he should make his report of these statistics to the county clerk, or directly to the State Board of Health?

At present the supervisor and justices of the peace in every township, with the township clerk as its clerk, constitute a local board of health.

In cities and villages the mayor and aldermen, and president and council, or trustees, constitute the board of health.

The law provides that these local boards of health "*may* appoint a physician to the board, who shall be the health officer of his township, city, or village."

It is a question which the Secretary of this State Board can best answer,

how many of these local boards of health are ever really organized or act as boards of health, and how many of them have actually chosen an efficient health officer, and how many of these township boards have ever acted in any questions regarding the public health.

Certainly it would seem that the appointment of a judicious and efficient health officer would be as likely to meet the wants and advance the real interests of the people as that of any other officer. I am sure it only needs that the people be really apprised of the great number of deaths and the vast amount of sickness that now occur from causes wholly, or to a large degree, preventable, to cause them to send to the Legislature men intelligent on such subjects, and to demand of them that laws based on these facts and on hygienic principles be enacted, looking to the promotion of the health, and the saving of the lives of the citizens. If all the people are not thoroughly intelligent upon these subjects, can the Legislature engage in a better effort than by the best and most efficient means to bring the important information to every citizen?

ONE OBSTACLE TO IMPROVEMENT IN PUBLIC HEALTH.

Practically, there stand before the very entrance to one field that I have proposed for the combined effort of statesmen, philanthropists, and hygienists, many grave and important questions, as yet, in some sense, *sub judice*.

It is claimed on the one hand that the free sale and habitual use of ardent spirits causes more sickness and more deaths than any other preventable cause; that more cases of insanity and idiocy take their origin, remotely or directly, from this cause than from any other; that the free sale and use of alcoholic drinks is chargeable with more crime than all other causes; that the free sale and use of spirituous liquors actually causes a greater pecuniary loss to the State than all the profits from its traffic. On the other hand, it is claimed by those engaged in the traffic, and by most whose pecuniary interests are in any way advanced by it, that the statements of the evils that grow out of the traffic are assumed or exaggerated, or, at least, not demonstrated by indisputable and recorded facts. And the large pecuniary interests of many citizens, whose property is invested in, and whose families are supported by the trade, is made to do great service in throwing dust in the eyes of all who are looking for the truth as to the value of the traffic, and in casting every variety of shade and coloring upon the facts as they are partially developed by individuals.

The result has been inefficient, impractical, or decidedly wrong legislation. Now, what is needed before any further legislation, what is needed for a real substantial basis for arguments against, or for, the free sale and use of ardent spirits; what is needed as an intelligent basis for all hygienic effort in this field is, that the actual facts in the matter, so far as it is possible to ascertain them, should be established by a commission, so competent, honest, and faithful as that their report shall, by common consent, be taken as the basis of all argument, effort, and legislation upon this subject.

Ought not this Board, ought not all hygienists, philanthropists, and statesmen in our State, to make an effort, strong and continuous, until it shall be successful, to induce the Legislature to raise a commission of three or four most intelligent, most capable, and trustworthy citizens, whose duty it shall be to study all the elements of this question, and especially to ascertain, with the most certainty and exactness possible, all the facts pertaining to the money

value of this traffic to the State, and its effects upon the vital and criminal statistics?

Let this commission take a sufficient time for the thorough study and investigation of these questions, be it two, four, or six years, and let an appropriation be put at their disposal sufficient to enable them to avail themselves of all the best means for their intelligent and authoritative answer. Is not this centenial year most appropriate and auspicious for the inauguration of such a movement? The duties of such a commission, *well done*, at a cost to the State of even $100,000 would prove in the next century of almost incalculable benefit to the citizens of the State.

MEANS OF

ESCAPING FROM PUBLIC BUILDINGS

IN CASE OF FIRE.

By R. C. KEDZIE,

MEMBER OF THE

STATE BOARD OF HEALTH

AND

CHAIRMAN OF COMMITTEE ON BUILDINGS, PUBLIC AND PRIVATE

MEANS OF ESCAPING FROM PUBLIC BUILDINGS IN CASE OF FIRE.

A careful examination of most of our public buildings, hotels, theatres, public halls, churches and school houses, will show that very few of them are so constructed as to ensure the rapid and safe egress of a large crowd in the case of a sudden alarm of fire. It is not enough to say that if all avenues of escape are left free and unobstructed, and if the crowd will issue in an orderly manner, there are sufficient means of escape. In a sudden alarm of fire we often find these conditions of safety exactly reversed: the fire often seizes one or all the avenues of escape, or these avenues are closed by the frantic efforts of the crowd to escape; and it is vain to look for cool judgment in those who are seeking to escape when a crowd is seized with overpowering fear and a panic ensues. No animal is less under the control of reason than a panic-stricken crowd. Take as an example the burning of the theatre in Richmond, Va. This, indeed, occurred a great many years ago, but its warning should not be forgotten so long as the conditions for the repetition of the horror still exist in our midst. The theatre was filled with the flower of Richmond: the theatre was discovered to be on fire, and the fire beyond control, when the terrified crowd rushed for the door. In the eager effort to escape, the doors, which *opened inward,* were closed, cutting off all escape. Urged on by the flames, the crowd pressed against the doors so as to prevent all possibility of their opening. If the crowd would only fall back so as to let the doors open, all might have been saved; but the crowd would not fall back, those who had enough judgment to comprehend the only way of escape might fall back, but their places were instantly filled by those who were insane with terror, and the doors remained closed till the great mass perished in the flames. Of a whole theatre full only about one hundred escaped, by jumping from the windows: all the rest fell victims to the madness that ruled the hour and to the folly which constructed the doors in such way that they could only open inwards. If the doors had opened outwards, no such locking and barring of the doors by the pressing crowd would have been possible.

If any one will notice the construction of the doors in our theatres, halls, churches and school houses, he will shudder to observe that one prime condition of the calamity which clothed Richmond in mourning, still remains in our midst, ready to afford a repetition of this horror in almost every public building in our land! Let not Richmond theatre be forgotten *till every door of ingress and egress in every public hall, church and school-house of our land* OPENS OUTWARDS!

That this danger is real and not a mere fancy, I cite the case which occurred a few months ago in the Methodist church in Adrian, an account of which was given in the Adrian Times. An evening meeting was held in the church, during which a neighboring building took fire and its bright light flashed into the church, when some one raised the cry of fire. A panic seized the congregation who rushed in a mass for the door which was closed by the pressing crowd and all egress effectually prevented. If the fire had been in the church instead of another building, the Richmond tragedy would have been re-acted in the Methodist church; but fortunately there was no fire, and there was time for people to regain their reason. Dr. Rynd mounted a table and in stentorian tones told the crowd there was no fire in the church and no danger: that if they would fall back the doors would be opened and all could go out. The crowd heeded the sensible advice, the doors were opened and all danger averted. The Methodist church, with eminent good sense, within a week, had the doors hung so as to *open outward*, and such a scene of terror is impossible in the future history of that church.

Yet every church in our State whose doors open inwards (the almost universal condition) is exposed to like scenes of terror and danger as was the Methodist church of Adrian before this change.

Let us look at other places of public gathering where the danger is still greater. Theatres and lecture halls are usually in the second or even third story, the ground floor being devoted to stores, shops, etc. The outside doors, often at the foot of the stairs which lead to the hall above, almost always open inwards: they may thus become man-traps of the most fatally approved pattern in case of a panic of any kind, many being liable to be crushed and trampled to death in an excited crowd even if they escape death by fire. One lecture hall in this city has two sets of doors both opening inwards; one entering the lecture room and the other at the bottom of a flight of stairs leading to the street. I should dread to be in a panic-stricken crowd in that hall.

The danger is greater in such halls high up from the ground than in a church or one-storied building, because of the increased danger to life and limb from leaping from such a height.

The entrance to the body of the hall or theatre is usually on each side of the stage. Fires are much more liable to occur on or near the stage in consequence of the large amount of inflammable material in this quarter, and from the large number of gas lights, etc. If the stage takes fire the means of escape from the building may become blocked at once by the fire itself, and if there is no escape in other directions, the danger is appaling. But if the doors by which escape is possible in any direction, open inward, the danger of closing these doors by the escaping crowd still remains, and it is only by good luck that such a calamity is averted. *No public building is safe whose doors open inwards.* The owners of such places of public resort should be compelled by law to arrange all doors of public ingress and egress so that they will open outwards; and all persons should be subject to heavy fines who shall hereafter erect buildings for public resort whose public doors do not open outwards.

If we look at the arrangement of even our best hotels, we find new sources of danger added. To provide rooms for a large number of guests, story after story is piled up till the guest finds himself at a dizzy height above the ground, and to leap from his window would be almost certain death. Tortuous stairs and halls leading in many directions leave the bewildered stranger at a loss which way to turn for safety.

The usual means of ascending and descending to and from this many-storied pile, are by elevators and by stairs. When fire originates in the lower story it tends to sweep upward by any opening up which a strong draught can ascend: it tends to the stairway and the elevator by which it may sweep from basement to attic like a rocket, pouring a stream of fire into every hall and story. We usually find that either at the beginning or early in the progress of hotel fires, the stairways and elevator shaft are filled with flame. If there is more than one way of escape, the stranger will hardly know how to avail himself of facts of which he is naturally in profound ignorance, and he ought to be provided with some easily accessible and certain way of escape. In the burning of the Herndon House in Marshall last year, the fire took possession of the stairway in the outset, and all escape was cut off save by leaping from the lofty windows. In this instance some of the *employés* of the house, who would naturally be familiar with every way of escape, were burned to death.

In looking over the means of saving life, even in our best hotels, one is reminded of the story of the traveler in the far west, who, when shown up to his elevated room inquired: "What protection does your house afford in case of fire?"—"There is a pitcher of water in every room!"—blandly replied boniface. Yet what better protection do most of our hotels afford? Will the public demand something better than a pitcher of water in every room? I do not desire to awaken needless alarm, but I think an intelligent public will decide that most of our hotels do not afford adequate means of escape in case of fire, and that some means of affording greater protection to life should be devised, viz.: *some means of escape from every room.* A rope ladder, or at least a knotted rope, sufficiently long to reach the ground should be securely attached to a staple by a window in every room, by which a person could safely descend to the ground. Every one would thus have the means of immediate escape, and the bewildered stranger would not then be left to perish while searching for some unknown means of escape. The expense of such an arrangement would be trifling, and life would be more secure. God grant that some frightful holocaust may not be required to secure so obvious a means of escape!

This whole subject of preventing the waste of life by so terrible an agent as fire is one of the duties imposed upon this Board by its organic law. "The State Board of Health shall have the general supervision of the interests of the health and life of the citizens of this State." When we see the health and life of large masses of our citizens in church, in theatre, in school room, in lecture hall and in the hotel exposed to such danger, we shall fail of the high duty imposed upon us as guardians of the public weal if we do not call the attention of our citizens, and especially of our Legislature, to these avoidable causes of suffering and death. We call upon the people, that irresistible "power behind the throne," to ask of our Legislature that it throw the strong arm of legal protection around the masses of our citizens by COMPELLING ALL PUBLIC DOORS TO OPEN OUTWARDS, *and by providing means of escape from every hotel room in our State.* Such legislation is not an untried innovation. New Hampshire has led the way by enacting the following law:

"AN ACT FOR THE BETTER PROTECTION OF PUBLIC ASSEMBLIES."

"*Be it enacted by the Senate and House of Representatives in General Court convened:* SECTION 1. The outer doors, and doors of all passages leading outwards, of all churches, school-houses, depots, public halls, and buildings to be used for public purposes, hereafter constructed, shall open outwards.

"SECTION 2. If any person shall neglect to comply with the provisions of section first of this act he shall pay a fine not exceeding five hundred dollars for the benefit of the county where such building is located, to be recovered by indictment.

"SECTION 3. This act shall take effect and be in force from and after its passage; and all acts and parts of acts inconsistent with this act are hereby repealed.

"Approved July 3, 1875."

Wisconsin has a more stringent law on this subject, as follows:

"AN ACT TO PROVIDE FOR THE BETTER PROTECTION OF LIFE IN THEATERS, CONCERT HALLS, LECTURE ROOMS, AND PUBLIC SCHOOL HOUSES.

"*The People of the State of Wisconsin, represented in Senate and Assembly, do enact as follows:* SECTION 1. It shall not be lawful for any owner, lessee, or manager of any theater, concert hall, or lecture room, to rent the same for public use, unless the owner, lessee, or manager first having all the doors of said theater, concert hall, or lecture room made, constructed and so hinged, locked and fastened as to open outwards, so that in case of fire or panic, that a rush is made to get out, the doors may be forced open in place of being forced shut, so that it would be impossible to open them.

"SECTION 2. Any person who shall neglect or refuse to comply with the provisions of this act shall be punished by a fine of not less than twenty-five dollars nor more than fifty dollars for each and every offense.

"SECTION 3. All penalties imposed by the provisions of this act may be recovered, with costs of action, by any person or persons in his or their name, before any justice of the peace in any city, village or town, in the county where any offense under this act may be committed, or where the party neglecting or refusing to comply with the provisions of this act, may reside or be found, and any justice of the peace shall have jurisdiction to hear, try, and determine all cases which may arise under the provisions of this chapter: *Provided,* The defendant shall not be deprived of a jury trial, nor of his right to appeal as in other cases.

"SECTION 4. All penalties for the violation of this act, when collected, shall be paid by the court before which such conviction shall be had, to be placed to the credit of the school fund.

"SECTION 5. Any person who shall be convicted of any offense under this act, and who shall fail to pay the penalty and costs of such prosecution, shall be committed to the jail of the county in which such conviction shall be had, for a period of not less than ten days, when the penalty in such cases does not exceed the sum of twenty-five dollars, and for the period of one day additional for each dollar, by which the amount of such penalty shall exceed in amount the sum of twenty-five dollars.

"SECTION 6. This act shall take effect and be in force from and after its passage and publication.

"Approved March 13, 1876."

Shall Michigan be less ready to protect the lives of her citizens than New Hampshire and Wisconsin?

This whole subject is respectfully referred to the consideration of an intelligent public.

LANSING, June 26, 1876.

VACCINATION.

SOME FACTS AND FIGURES CONCERNING THE ADVISABILITY, WITH STATEMENTS OF THE DANGERS TO BE AVOIDED.

By ARTHUR HAZLEWOOD, M. D.,

OF GRAND RAPIDS,

MEMBER OF THE

STATE BOARD OF HEALTH.

VACCINATION.[a]

The vaccine disease or cow-pox, being of itself a mild and innocuous disease, its chief interest centers in the claim that it is a safe and innocent substitute and prevention to that most terrible, loathsome, and life-destroying visitant, viz.:

SMALL-POX.

Previous to the beginning of this century small-pox was in all old and thickly settled countries a very prevalent and justly dreaded disease; dreaded not alone for the large number of deaths in proportion to the number attacked, but also because of the after effects, with which so many were permanently disfigured, or rendered incapable of earning a livelihood by blindness, etc.

"Unless the reader has scanned the long list of villainous portraits exhibited by the Hue and Cry in the old papers of the last portion of the seventeenth and first portion of the eighteenth centuries, he can form but a faint conception of the ravages committed by the small-pox upon the population. Every man seemed more or less to have been speckled with pock-holes; and the race must have presented one moving mass of pits and scars."*

Some idea of the destructiveness of this disease may be obtained from many sources; among others, it is stated that as late as 1734 Greenland suffered its first attack of small-pox, when nearly two-thirds of its inhabitants were swept away. In Iceland, at its eighteenth visitation (1797), it is said to have destroyed 18,000 persons out of a population of about 50,000. Striking accounts of its ravages among the North American Indians may be gathered from Catlin's "Letters and Notes on the Manners, Customs, and Condition of the North American Indians" (London, 1841). he states, "I would venture the assertion, from books I have searched and from other evidence, that of the numerous tribes which have already disappeared, and of those that have been traded with, quite to the Rocky Mountains, each one has had this exotic disease in their turn, and in a few months have lost one-half or more of their numbers." Mr. Lloyd, the translator of Prince Maximilian's Travels in the interior of North America, gives a vivid sketch of an epidemic of small-pox which befell the Indians about forty years ago, and says, "The ravages of the disorder were the most frightful among the Mandans, where it first broke out. That once powerful tribe which, by accumulated disasters, had already been reduced to 1,500 souls, was exterminated, with the exception of thirty persons." In England in

[a] In the compilation of this article, I have availed myself of the writings of Drs. Aitken, Watson, Tanner, Curschmann, and others; also of the Reports of the General Board of Health of Great Britain, and have in some instances made quotations from the same; which, to save a multiplicity of reference notes, I acknowledge in this manner.

* Quarterly Review, July, 1855.

the half century from 1750 to 1800, to every 1,000 deaths, 96 were from small-pox (Aitken). In various German States before the advent of vaccination, 66.5 deaths in every 1,000 were from small-pox, or in other words the deaths from small-pox averaged one in every ten to sixteen deaths from all other causes combined. The continued presence of so much suffering and death from one disease could not help but call out the sympathies, and stimulate the efforts of physicians and others in all countries to find expedients either to overcome or modify the ravages of so fell a destroyer. By some means it was discovered that the insertion of the lymph of a small-pox pustule under the skin of a previously non-affected person induced the disease, but in a surprisingly modified form. "The Chinese claim to have been in the habit for many centuries of sowing the disorder by putting some of the crusts into the nostrils." "It is said a true engrafting of the virus has been in use by the Brahmins in India time out of mind." The Turks practiced it as early as the beginning of the eighteenth century, and it was owing to the influence of Lady Mary Wortley Montague, who resided in Turkey in 1718, that engrafting or inoculation was introduced into Great Britain. The advantage to the individual was considerable,—taking it for granted that at some time during his life he must have small-pox,—by artificially inducing the disease, as the mortality from the natural small-pox was as one to three or five cases, whilst by inoculation it was estimated that the deaths were reduced to one in five hundred cases.

But in spite of this lessened danger to the individual inoculated, the number of deaths from small-pox increased, because in the treatment of the cases of artificially induced small-pox, it was considered best to allow the affected person full liberty to go about the streets and use public conveyances and thus become a center of contagion to the unprotected portion of the community.

Such was the condition of things previous to the last decade of the last century. And although tradition had said, and isolated facts proven, the immunity of those persons who had accidentally contracted cow-pox from subsequent attacks of small-pox, no scientific investigations had been made to confirm or disprove the tradition.

"Edward Jenner, the son of the Rev. Stephen Jenner, vicar of Berkley, in Gloucestershire, was born 17 May, 1749. While serving his apprenticeship to Mr. Ludlow, a surgeon at Sodbury, near Bristol, a young woman came to the house, and the conversation happening to turn upon small-pox, she said: 'I cannot take the disease, for I have had the cow-pox.' This observation made a great impression upon Jenner's mind, but did not bear fruit for some years." This was the small seed which has grown into so mighty a means of saving humanity from deformity and death. Whilst completing his professional studies in London, Jenner mentioned the circumstance to John Hunter, and suggested the possibility of its being a prevention of small-pox by artificial induction. That eminent and sagacious observer, however, pooh-poohed the idea as vague and improbable, and thus the matter rested with only occasional thoughts and deferred plans until Jenner had taken his Doctor's degree at St. Andrews in 1792, when he found leisure thoroughly to investigate the subject.

"Dr. Jenner set himself to trace, if possible, the origin of the disease of the cow. First he found that it was peculiar to certain dairies; then, that in those dairies men were employed in milking. Following up this clue, he further made out that those men had also the charge of the farm horses. Next he learned that the teats of the cows generally began to exhibit the specific eruption at that time of the year when a complaint called 'the grease' chiefly prevailed among

the horses. Hence he concluded that the malady was conveyed to the cows by the hands of the men who had been dressing the heels of horses affected with the grease." Dr. Jenner believed most thoroughly in the identity of cow-pox,—variola vaccina, as he called it,—with the horse, swine and sheep-pox and the small-pox of the human species. It seems certainly to have a very close relation, for it has been frequently noticed that when epidemics of pox affecting the animal creation are prevalent, small-pox among human kind is equally prevalent, and also during the prevalence of small-pox, cattle are apt to be affected with cow-pox, and as an affection similar in appearance to cow-pox may be induced by the artificial inoculation of a cow with the lymph from a small-pox pustule, and if a susceptible person be vaccinated with the lymph from this artificially induced cow-pox, merely local pustules will be induced without a general eruption. If, then, it be not demonstrated that the cow-pox and small-pox are identical diseases, varied by the difference in the animals affected, there is certainly presumptive evidence in favor of the belief. But Dr. Jenner found many difficulties in the way of proving to himself even the truth of the matter, as his researches had necessarily at first to be carried on by examining those who had accidentally taken the cow-pox. In some instances he found persons subsequently affected with small-pox who had had sore hands from milking affected cows; but by continuing his researches he found that there were other sores affecting cows' teats beside those of the true vaccine disease; and further, he proved that some who had had the true infection were not fully protected from the invasion of small-pox. This he found to arise from the advanced stage of the disease in the cow from which the virus was communicated to the milker; the thick matter from the vesicle in the later stages of its progress having less protective power than the clearer lymph of a less mature vesicle. The same thing had been remarked in inoculation; the later the stage of the vesicle the less surety of inducing the disease. Dr. Jenner felt so sure of his theory that at last, on the 14th day of May, 1796, which might be termed the birth-day of vaccination, he put it publicly to test. "On that day matter was taken from the hand of Sarah Nelmes, who had been infected by her master's cows, and inserted by two superficial incisions into the arms of James Phipps, a healthy boy of about eight years old. He went through the disease apparently in a regular and satisfactory manner; but the most agitating part of the trial still remained to be performed. It was needful to ascertain whether he was secure from the contagion of small-pox. This point, so full of anxiety to Dr. Jenner, was fairly put to issue on the first of the following July. Variolous matter, immediately taken from a pustule, was carefully inserted by several incisions, but no disease followed." In 1798 he sent the results of his observations and experiments to the President of the Royal Society for publication, fully convinced of its importance, and expecting it to be well received, but he was mortified by its rejection.

Although lacking the approbation of so powerful a society, he published his paper, and it very quickly attracted public notice and excited much discussion. In this treatise he emphatically declared that inoculation with virus from the true vaccine pustule of a cow, and also that obtained by human transmission produced a mild, non-contagious and innocuous disease which would forever protect against all danger from variola. These conclusions were at once accepted, as proven or probable, by persons of judgment and authority in the medical profession. In these early days of the discovery almost every case of vaccination was made a test of the alleged protection.

Dr. Jenner writing in 1801 says, "upwards of 6,000 persons have now been inoculated with the virus of cow-pox, and the far greater part of them have since been inoculated with that of small-pox, and exposed to its infection in every rational way that could be devised, without effect; and Dr. Woodville said that within two years (1799–1801) there were vaccinated at the Small-Pox Hospital 7,500 persons, of whom about one-half were subsequently inoculated with small-pox matter, and in none of them did small-pox produce any effect. Other observers had collected instances of persons who had accidentally contracted infection from the cow, and yet many years subsequently were capable of resisting all attempts to induce the small-pox disease by inoculation. These facts tell their own story. Dr. Jenner was a modest, painstaking, and cautious observer, who had carefully reviewed and anticipated, all possible objections before publishing his discovery to the world, and thus having laid a foundation of fact for every statement he advanced, was convinced of their truth, and consequently bold in their advocacy. Ever since the publication of Dr. Jenner's pamphlet, objectors have not ceased to cry out,—often with ridiculous statements,—and whenever they have had an apparent show of reason for their claims, careful inquiry has proven their assertions groundless or greatly exaggerated. The earliest objections were mostly foolish,—as, that it was unnatural and injurious to engraft the disease of a brute upon a christian, or that the insertion of the vaccine virus would convert children into horned beasts, or give them features resembling cattle. Although such objections are now rare, it is not long since a parent refused vaccination to his child on the ground that the operation induced stammering. Such objections do not now need refutation. Another form of objection requires more extended notice, namely, that by vaccination other and more loathsome diseases are at the same time introduced into the system. This objection unfortunately has some apparently good evidence upon which to stand. Certain vaccinated persons have at different times been found to be infected with syphilis, which it is claimed was introduced into the system at the time of vaccination. The following is a very interesting and notable case reported by Dr. G. Lanoix, chief of the service of vaccination in the hospital of Paris.

"On the 12th of November, 1868, having called at the St. Louis hospital, Paris, I learned casually from M. Hardy that on the preceding day he had observed a case of vaccinal syphilis in an adult who had been vaccinated at the academy several months previously.

"Thinking that this might be a new case of epidemic vaccinal syphilis, I resolved to make personal inquiries, and I was at last enabled to ascertain the precise day on which this person had been vaccinated at the academy; it was on the 19th of August preceding; on that same day ten children and thirty-three soldiers had been vaccinated.

"Continuing my researches, I ascertained the names of the two from whom the virus had been obtained; their names were Conrad and Rousselot. A few soldiers only had been vaccinated from Rousselot; Conrad, on the contrary, had furnished most of the vaccine used on that day. On the day I made my inquiries, the 13th of November, nearly three months subsequent to the vaccination, the child Rousselot was in perfect health. As to the other child, it was dead; its death had occurred two days after having supplied his virus at the academy."

Without quoting this writer as to the history of the child Conrad, who was undoubtedly syphilitic, it is necessary to give the results of his inquiries. He continues:

"Having thus ascertained where the vaccine had come from, I made it my first duty to seek out those who had been vaccinated. I will not detain you with all the details of this long and painful search for several days through Paris and its suburbs; it will suffice, I think, to say that I succeeded in finding all the subjects of that day's vaccination. I reported to Dr. Depaul my sad discoveries, and he accompanied me to see what I had seen. Of the ten children vaccinated on the 19th of August, two had already died before the 14th of November; the others were all syphilitic. You may believe, gentlemen, that I did not rely upon my own judgment uncorroborated. I submitted my diagnosis to such masters as Messrs. Bruchut and Ricord, who entirely confirmed it."

Another series of cases reported by J. Hutchinson, Esq., surgeon to the London hospital in 1871, confirm the possibility of syphilitic infection by vaccination. He says:

"On the 7th February, thirteen persons were vaccinated (young adults) from the arm of a healthy looking infant. All except one had normal vaccine vesicles, which healed well. In all except two, indurated chancres have since developed in the vaccination scars. The infant from whom these persons were vaccinated is undoubtedly the subject of inherited syphilis, the taint having been latent at the time of vaccination."

"The two who escaped the syphilitic contagion were the first two vaccinated, and probably they received pure lymph, whilst the others received blood as well. It is known that the vaccinifer's spots bled during the vaccination."

I have quoted these cases, being authentic, to incite all parents and guardians of children, as well as adults who may expect to be vaccinated, to insist on the proper conditions of a harmless vaccination being carried out; for although these cases give sad results, such results are not chargeable to vaccination itself, but only to its careless performance.

Mr. Hutchinson's inferences from his cases were, "1st, That the blood of a child in the latent stage of inherited syphilis is capable of producing primary syphilitic sores in its recipients, and is, indeed, remarkably efficient as a means of contagion; 2d, That the vaccine virus itself, even when taken from a syphilitic subject, produces nothing but the true vaccine disease; 3d, that the two poisons may be conveyed (in two fluids) at the same time, and may each produce its specific effects." Mr. Hutchinson, however, "expressed his faith in vaccination in the strongest terms. He informed the committee that the danger of vaccinal syphilis was infinitesimally small; that he had vaccinated all his own children and should continue the practice. He was of the opinion that the stringency of the law should not be relaxed, but that it should be an object of legislation to surround the operation with every possible safeguard."—"When vaccination has been successfully performed on a healthy child an elevation may be felt over the puncture on the second day, accompanied by slight redness; on the fifth a distinct oval or circular vesicle is formed, having an elevated edge and a depressed center; on the eighth it is of a pearl color, and is distended with clear lymph. This vesicle is composed of a number of cells, by the walls and floor of which the lymph is secreted. An inflamed ring or areola gradually forms around the base of the vesicle, and at about the eleventh day this begins to fade, so that the vesicle acquires a brown color, and by the end of the second week becomes converted into a hard round scab. This falls off about the twenty-first day, leaving a circular, depressed, striated cicatrix (scar), which is usually permanent in after life."

The operation itself may be performed as the operator sees fit, either by a number of cross scratches, just enough to draw blood, or by punctures. The former plan I like the best, as giving the most exposed surface for the reception of virus; but in either way a perfectly clean lancet should be used, one that has not been used since grinding for any other operation being preferred. And if human virus is used it should be taken directly from the vesicle on the eighth day, and in no case should scab of human virus be used, or virus mingled with blood.

The constitutional disturbance occasioned by this operation is usually slight, although it is not uncommon for the surrounding redness to spread over a large part of the surface of the arm, and accompanied by a smart fever. In spite of the efforts of the opponents of vaccination, no unprejudiced observer can any longer be in doubt as to its efficacy and practical value. It would seem almost superfluous at this time to produce arguments in favor of vaccination; yet, as many claim that the practice is worse than useless, it becomes our duty in all kindness to strive to do away with their objections, which, if not rooted in prejudice, must certainly be removed, if they will examine the facts.

In this country the data for basing calculations upon, and making tables, are insufficient and unsatisfactory. The practice of vaccination has been left to individual choice mostly. In some instances school superintendents have required its performance before admitting pupils to the schools under their charge. And cities have at times of epidemic invasion required the residents to be protected by its influence; but these spasmodic attempts, although successful in enabling physicians to isolate and stamp out the small-pox in a given locality, have not been made available for statistical reference, so far as I am aware. The annexed tables give some conclusive results:

Terms of years Respecting which Particulars are Given.		Territory.	Approximate average annual death-rate by small-pox per million of living population.	
			Before introduction of vaccination.	After introduction of vaccination.
1777–1806 and	1807–1850	Austria—Lower	2,484	340
1777–1806	1807–1850	Austria—Upper and Salzburg	1,421	501
1777–1806	1807–1850	Styria	1,052	446
1777–1806	1807–1850	Illyria	518	244
1777–1806	1838–1850	Trieste	14,046	182
1777–1803	1807–1850	Tyrol and Voralberg	911	170
1777–1806	1807–1850	Bohemia	2,174	215
1777–1806	1807–1850	Moravia	5,402	255
1777–1806	1807–1850	Silesia (Austrian)	5,812	198
1777–1806	1807–1850	Gallicia	1,194	676
1787–1806	1807–1850	Bukowina	3,527	516
1776–1780	1810–1850	Prussia—East	3,321	556
1776–1780	1810–1850	Brandenburgh	2,181	181
1776–1780	1816–1850	Westphalia	2,643	114
1776–1780	1816–1850	Rhenish Province	908	90
1781–1805	1810–1850	Berlin	3,422	176
1776–1780	1816–1850	Saxony	719	170
1774–1801	1810–1850	Sweden	2,050	158
1751–1800	1801–1850	Copenhagen	3,128	286

PLACES AND TIMES OF OBSERVATION.	Total Number of Cases Observed.	Deaths in 100 Cases of Small-Pox.	
		Among the Unprotected.	Among the Vaccinated.
France, 1816–41	16,397	16⅛	1
Quebec, 1819–20	?	27	1⅔
Philadelphia, 1825	140	60	0
Canton Vaud, 1825–9	5,838	24	2 1-6
Darkehmen, 1828–9	134	18 4-5	0
Verona, 1828–39	909	46⅔	5⅔
Milan, 1830–51	10,240	38⅓	7⅔
Breslau, 1831–3	220	53 4-5	2 1-9
Wirtemberg, 1831½–5½	1,442	27⅓	7 1-10
Carniola, 1834–5	442	16¼	4 2-5
Vienna Hospital, 1834	360	51¼	12½
Carinthia, 1834–5	1,626	14½	½
Adriatic, 1835	1,002	15 1-5	2 4-5
Lower Austria, 1835	2,287	25 4-5	11½
Bohemia, 1835–55	15,640	29 4-5	5 1-6
Gallicia, 1836	1,059	23 1-2	5 1-7
Dalmatia, 1836	723	19⅔	8¼
London Small-pox Hospital, 1836–56	9,000	35	7
Vienna Hospital, 1837–56	6,213	31	5
Kiel, 1852–3	218	32	6
Wirtemberg, no date	6,258	38 9-10	3½
Malta, no date	7,570	21.07	4.2
Epidemiolog. Soc. Returns, no date	4,624	19.7	2.9

Selecting a few of the results taken from these tables, it will appear that in Copenhagen the fatality from small-pox is but an eleventh part of what it was before vaccination was introduced; in Sweden but about a thirteenth; Berlin, and parts of Austria, a twentieth; Westphalia but a twenty-fifth; or, in other words, where formerly one hundred persons died from small-pox, since vaccination but four die from that disease.

I am aware that these tables, though conclusive to unprejudiced minds, will be assailed as of foreign origin, and the claim made that the conditions in old countries are different from what they are here, etc., etc. This assertion I deny. Small-pox, when introduced into the cities of the United States, is just as destructive as in cities of like size on the eastern continent. The percentage of deaths averages to the unvaccinated just about the same,—thirty and a fraction per one hundred cases, whilst to the vaccinated the percentage of deaths appears to be larger in the United States. The cause of this discrepancy is, to my mind, very readily apparent: When vaccination is carelessly performed, the protection afforded is almost nothing, and the recording of cases as vaccinated, when no typical scar remains as a proof, is a great source of error. Dr. Jerome Cochran, in his History of the Small-Pox Epidemic in Mobile, says:

"The records of our Mobile epidemic give the percentage of deaths to cases in vaccinated persons as 20.90; in persons not vaccinated at 25.94; in persons in whom this point was not reported, 67.18; and of the last two classes together at 30.58. I give these statements for what they are worth, which I am obliged to say is very little. In most particulars our statistics are remarkably complete and accurate; but as regards this particular point they are sufficiently other-

wise. Inquiry was made by the agents of the Board of Health in every case as to whether the patient had been vaccinated or not, and the answers obtained were placed on record; but I was able to satisfy myself that in a very large proportion of cases the answers were entirely unreliable. Every negro who had ever had his arm scratched reported himself as vaccinated; but when the arms were examined very often not the slightest vaccine mark was to be found. Add this source of uncertainty to the fact that in most of the cases that had been vaccinated the vaccinations were of many years' standing, and very rarely presented more than a single scar, and we have ample explanation of the wide divergence of our statistics and the European statistics."

Fortunately in Michigan we have been exempt from any severe visitation of small-pox; yet, occasionally a few lives are sacrificed upon its altar, some every year. The numbers, however, are too few to make conclusions from. *"Now, although a year may soon come, and unless vaccination is somewhat general, is likely to come, when the disease may so prevail in this State that it will be possible for persons here to compile a statement for 'their own vicinity,' the numbers heretofore returned have not been large enough to work out therefrom any convincing statistics of this nature. They would not be large enough to establish any such point with certainty, even had they all been in one vicinity, and therefore all accessible, instead of scattered throughout the State as they were."

"Sufficiently complete statistics have been collected in so many localities that there is now no probability that locality has such a modifying influence on the subject that the evidence would be materially different, if it could be satisfactorily collected, in Michigan."

From these quotations, and from the well known prevalence of small-pox in all inhabited parts of the world, it seems to me short-sighted and fatally erroneous to imagine that, because Michigan has heretofore suffered but little from small-pox it must always be so, unless proper measures are taken to anticipate and thus prevent the scourge. Chief among the proper measures I should rely upon a proper and thorough vaccination, and by thorough I include not alone the vaccination of every person throughout the State, but also that each person so vaccinated should have reliable vaccine virus inserted into from four to eight different punctures or scratches at the time of operation. The necessity for a multiple number of insertions of the vaccine virus has, I am convinced, received too little consideration at the hands of the medical profession, and consequently from citizens generally.

The only reliable data I can find upon this part of the subject is derived from the careful researches of J. F. Marston, resident surgeon to the Small-Pox Hospital in London during sixteen years. The following table is from his paper:

*From a letter to writer from Dr. Baker.

PATIENTS ADMITTED WITH SMALL-POX.	No. of Patients.	Character of Cicatrices.	Cases.	Forms of the Disease.															Results.				
				Eruption Unmodified in 945 Cases.							Eruption Modified in 2,149 Cases.												
				Confluent.	Died.	Semi-Confluent.	Died.	Distinct.	Died.	No. of Unmodified Cases.	Confluent.	Died.	Semi-Confluent.	Died.	Distinct and Varioloid.	Died.	No. of Modified Cases.	Discharged.	Died.	Died Affected by Superadded Disease.	Rate Per Cent. of Mortality from Small-Pox after Deducting Entirely the Cases Affected by Superadded Disease.		
1. Having one vaccine cicatrix	1,357	Good.	768	107	34	72	2	30	----	209	131	5	133	1	295	2	559	724	44	12	4.23	7.57	
		Indifferent.	589	168	68	57	1	26	----	251	110	11	80	----	148	1	338	508	81	12	11.95		
2. Having two vaccine cicatrices	888	Good.	608	66	20	44	2	12	----	122	115	4	91	----	280	1	486	581	27	11	2.68	4.13	
		Indifferent.	280	51	21	31	1	9	----	91	43	3	40	1	106	----	189	254	26	6	7.29		
3. Having three vaccine cicatrices	274	Good.	187	13	5	12	----	6	----	31	22	1	34	----	100	1	156	180	7	4	1.63	1.85	
		Indifferent.	87	7	3	7	----	5	----	19	17	----	11	----	40	----	68	84	3	1	2.32		
4. Having four or more vaccine cicatrices	268	Good.	202	10	2	9	----	1	----	20	38	----	22	----	122	----	182	200	2	------	0.99	0.74	
		Indifferent.	66	6	----	----	----	----	----	6	10	----	5	1	45	----	60	65	1	1	0.00		
5. Stated to have been vaccinated, but having no cicatrix	290	----	290	138	67	33	1	16	1	187	42	5	20	----	41	----	103	216	74	14		21.73	
6. Stated to have been vaccinated, but particulars of cicatrix not recorded	17	----	17	4	2	2	1	3	----	9	1	----	----	----	7	----	8	14	3	2		6.66	
Total	3,094	----	3,094	570	222	267	8	108	1	945	529	29	436	3	1,184	5	2,149	2,826	268	63		6.76	

He remarks: "Two hundred and sixty-eight patients had four or more cicatrices, and there died with good cicatrices just under one per cent, with indifferent cicatrices none, the average being only ¾ of one per cent. There is a difference in the last statement between the mortality of those having good and indifferent cicatrices that does not accord with the previous results; but all candid minds will readily be convinced that the average would have been preserved had the numbers been greater to have calculated from, for when all the numbers are taken together, there died with good cicatrices 3.04 per cent.; with indifferent cicatrices 9.77 per cent. Then, again, as regards the number of cicatrices, there died with one and two cicatrices 6.21 per cent.; with three, four or more cicatrices 1.30 per cent.

"The danger from small-pox arises in the great majority of instances solely from the quantity of eruption, from the extensive interruption and destruction of the functions of the skin produced by the pustules, in much the same way as from a severe burn or scald. Death may take place, and commonly does take place, without any perceptible disease of the internal organs essential to life, excepting the pustules on the air passages and congestion of the lungs, the latter being produced by the additional duty thrown upon them, as occurs whenever the healthy functions of the skin are interrupted. Knowing this, that the danger arises principally from the quantity of eruption, we may examine the question in another light. By referring to the table it will be seen that, of 2,245 patients with one and two vaccine cicatrices, 392, or 17½ per cent., had small-pox in a confluent unmodified form; whilst of 542 patients with three, four, or more cicatrices, 36, or 6½ per cent., only had the confluent, unmodified disease. Again, 1,765 patients had *good* cicatrices, of whom 196, or 11 per cent., had the confluent, unmodified disease; whilst of 1,022 with *indifferent* cicatrices 232, or 22 per cent.,—just double the percentage of the above,—had it in the unmodified form. Test the question in which way soever we will, the result is in favor of producing four vesicles at least in vaccination, with lymph that leaves good, permanent cicatrices."

This table also proves to some extent that the more thorough the influence exerted by vaccination, as evidenced by increased number of insertions of lymph, the liability to contraction of small-pox is lessened. Of those having one vaccine cicatrix 1,357 were admitted, whilst of those having four or more vaccine cicatrices but 268 were admitted, or in the proportion 5 to 1 in favor of the more effectively vaccinated.

The opponents of vaccination claim that it is not a protection in the manner and to the extent believed by the scientific medical world, though they bring no proofs to substantiate their opposition. This table in part refutes by actual facts their assertion; but being only of hospital patients, it does not prove much concerning the effect of vaccination upon communities where small-pox is introduced. Statistics having this object in view are scarce, and the subject seems to have been to some extent ignored. The difficulties in the way of making such statistics are very great, and could scarcely be accomplished in this country. Fortunately, our German friends have not found the difficulties insuperable. Albert Muller, M. D., of Waldheim, Germany, has given us some interesting results collected by a house-to-house visitation. His procedure was as follows:

* "By my advice two lists were drawn up, * * * one of which included all those who had been attacked with the disease, together with the name, sex,

* Translated by Norman Smith, M. D., N. Y. Published in N. Y. Medical Record, vol. 9, page 329.

age, dwelling, information as to how they had caught the disease, occupation, proof of vaccination, time and result of the attack, condition of dwelling, and mode of life; while the other specified the number of persons in each house who had or had not been vaccinated, the number of doubtful cases, and the number of persons revaccinated at a given period (beginning of 1873) of the epidemic. The objection may be raised that material obtained in this way is not reliable; nevertheless, the sources of error are not so great as would at first appear. In the first place, owing to the limited proportions of the field, it was possible in most of the cases to establish the correctness of the information given in regard to the sickness; and in this way I have been able to exclude the doubtful cases, allowing only such to be recorded in which a distinct eruption was present. But even laymen learn to recognize a distinct eruption during an epidemic; and I am convinced that the eruption of other diseases is very seldom mistaken for small-pox. The information regarding vaccination can lay claim only to an approximate correctness; since, however, the two lists in part control one another, and it is found, upon comparison, that the two almost exactly agree in those parts which are common to both, we can assume that no important mistakes have occurred. Nor is there any reason for supposing that incorrect information was willfully furnished. I have also been able, through the kindness of the district physician, Dr. Leonhard, to make use of the statistical reports of the city, as well as of its burial permits. These also served as a control upon a portion of the cases. The following are the results obtained according to the above mentioned plan:

"From January, 1872, to April, 1873, inclusive, there were in the little town of Waldheim 250 cases of small-pox (including the mildest cases), *i. e.*, about 5 per cent of the population. Among these were 134 who had been vaccinated (including those who had had small-pox before), and 126 who had not been vaccinated, or whose vaccination was unsuccessful. Waldheim had, towards the end of 1872 not including the house of correction and the garrison, a population, probably, of about 5,200 souls (after the census of 1871, 5,145). Among these were 4,713 who had either been vaccinated or had had the small-pox (93.2 per cent. of the population), and 342 (6.8 per cent.) who had either not been vaccinated at all, or in whom the vaccination had been unsuccessful. To these figures were added those of each category who had died up to the time of making up the lists. Of the number still remaining to complete the estimated number of the population, a part may be found among the children just born, and hence not included in the calculation, while the remainder, for reasons not ascertained, could not be traced; at all events they do not change the result, because they are in all probability distributed on both sides, according to their proper percentages. According to this, 2.6 per cent. of those vaccinated (124 out of 4,713) and 36.8 per cent. of those not vaccinated (126 out of 342) took sick. The proportion in Chemintz, according to Flinzer, was 1.61 per cent. of the former, and 57.22 per cent. of the latter.

"It must not be forgotten that the number of those vaccinated was almost 14 times larger than of those not vaccinated. If vaccination afforded no protection against small-pox, and we were to assume that those who have been vaccinated are attacked as often as those who have not been vaccinated, then in the present case 1,860 persons ought to have taken the disease. This enables us, therefore, to calculate the injury which the neglect to vaccinate is capable of causing."

This writer and observer was also able,—so far as the small field examined

could permit,—to bring positive evidence to bear upon "another argument often brought forward, but never proved, against the protective value of vaccination," to-wit; the assertion that the mortality in epidemics of small-pox is chiefly among the poor and outcast part of the population, and that it is because of this social misery, and not because of the neglect of vaccination, that they die more readily and numerously.

"In other words, it is maintained that the class to which the vaccinated belong is far less likely to contract any disease, small-pox included, than that to which the unvaccinated belong, and the small-pox mortality is proportionately no greater among these last than is the mortality incident to any other form of disease. Let us see how much this assertion is worth. We have in Waldheim a progressive system of assessment, according to which those liable to taxation can be arranged in convenient groups.

"Among about 5,200 inhabitants there are 1,491 liable to be taxed. Of these

	Thalers.	Class.
80 return an income of over	1,000	1st
124 return an income of from	500 to 999	2d
467 return an income of from	200 to 499	3rd
820 return an income of less than	200	4th

If we calculate from these figures, which represent the number of taxable people, the probable number of the inhabitants belonging to each class, we have:

First class	278
Second class	433
Third class	1,629
Fourth class	2,860

The 250 cases of sickness (small-pox) may be divided among the different classes as follows:

First class	5
Second class	24
Third class	55
Fourth class	166

The annexed table shows the same thing with additional details:

Number of Inhabitants.	Class.	Number of Sick.	Per Cent.	Average Per Cent.	Variation From the Average.	Vaccinated.	Unvaccinated.	Related to Each Other as:
278	I	5	1.8	4.1	−2.3	5		
433	II	24	5.5		+1.4	20	4	5 to 1
1,629	III	55	3.3		−0.8	33	22	3 to 2
2,860	IV	166	5.8		+1.7	66	100	2 to 3

"It follows, then, from the previous table, that the lowest taxable class gets sick the oftenest, and the first class the most rarely. It will also be noticed that the third class comes next in order to the first, as regards the disposition to sickness; while the second class surpasses the average almost as much as the fourth does. Then, if we examine this striking ratio of the second class somewhat more carefully, we see from the lists that only the four unvaccinated persons (all of whom, by the way, died) were under six years of age, while all of the remaining vaccinated persons were more than fourteen years old, viz.: seven between fourteen and twenty years, two between twenty-one and thirty, seven between thirty-one and forty, three between forty-one and fifty, and one was fifty-nine years of age. In other words, they had all reached the age when,

according to universal consent, the protective influence of the first vaccination is only very weak, or has altogether disappeared; they fall sick almost as often as the last class on the list (notwithstanding they belong to families who are in comparatively good circumstances), and obviously because the first vaccination afforded them insufficient protection, or none at all; for it must be borne in mind that up to the present time, revaccination has been seldom performed among the better families of the middle or burgher class. The first class occupies the most favored position of all as regards susceptibility to contract small-pox, the number of cases having been considerably under the average, and the five cases mentioned having been of a mild type. Those belonging to this class have all been vaccinated, and the greater part of them also revaccinated; and besides, they avoid coming in contact with small-pox patients as much as possible. The figures in the third class come very near to the average; that is, about one-thirtieth of the population belonging to this class take sick. The unvaccinated take the disease oftener. They constitute two-fifths of all those taken sick. It should be especially noted that *the vaccinated persons of this class do not get sick oftener than the vaccinated of the first class,* the average for both being about one-fiftieth of those belonging to each class.

"The fourth class, which includes workingmen as well as the scum of the population, contributes absolutely and relatively the largest share. About one-seventeenth of those belonging to this class are attacked by small-pox. The reason of this can be seen from the ratio of the vaccinated to the unvaccinated (sick persons), which is as 2:3. While the number of the vaccinated in all the other classes exceeds that of the unvaccinated, here the ratio is the inverse. Out of one hundred and sixty-six sick people only sixty-six had been vaccinated. The sixty-six vaccinated persons constitute here also only a little more than one-fiftieth of all those belonging to this class, but not more than in the first and third, notwithstanding the difference in outward circumstances. The comparatively large number of sick people is chargeable chiefly to the unvaccinated. This observation receives further support from the following calculation: among the population at large the proportion of the vaccinated to the unvaccinated was about fifteen to one; accordingly the fourth class would have had about two thousand six hundred and seventy vaccinated persons, and one hundred and ninety unvaccinated. Of the former sixty-six took sick, *i. e.*, 2.5 per cent., exactly the same ratio as was found for the vaccinated taken as a whole. Among the one hundred and ninety unvaccinated there should have been seventy cases (36.8 per cent.); in point of fact, there would probably be one hundred, because in this class the above mentioned proportion of fifteen to one is not correct, but has been changed, to the disadvantage of the unvaccinated. It must not be forgotten that the agitation against vaccination has always found adherents in this class of society; that, moreover, every attention to health, vaccination included, is grossly neglected. The morbility (liability to be sick) per cent. for the vaccinated in the remaining classes is, in the first, 2.0; in the second, 5.0; and in the third, 2.2. Here also, for reasons already discussed, the second class only exceeds the normal per cent., while among the rest, the different taxable classes, strange to say, give proportions approximately the same. Hence it follows that indigent and limited circumstances do not exercise any considerable influence on the frequency with which the disease is contracted. Whether other diseases are affected by the conditions just mentioned, I shall not attempt to decide. It is certain, however, that vaccination exercises a very decided influence on the tendency to take small-pox."

It is also claimed by anti-vaccinationists that an improved hygienic condition, and not vaccination, is the chief cause of the lessened numbers of small-pox cases now annually occurring. Although I do not wish to lessen the value of improved sanitary conditions, which I am convinced are the means of saving many valuable lives and preventing a large amount of sickness, still I cannot concede that such improved sanitary conditions will of themselves prevent the spread of small-pox when introduced into a given town or city, or else we should not have to chronicle the epidemics of small-pox which have occurred in the past few years, not only in this country, but in Europe. It is not to be supposed that any great lack of sanitary care has been allowed that has not also been permitted during the past ten years,—in all large cities,—yet England in 1871 had a total mortality from small-pox of 23,126. Philadelphia in winter of 1871–2 lost by death from small-pox over 4,000; other cities have likewise suffered in different parts of the United States. Mobile in a total population of 36,000 had 990 cases, with a mortality of 262 in less than eight months. Would such a state of things have occurred if hygienic measures were alone competent to cope with this fell destroyer? Hygienic measures are just as valuable in the other infectious diseases, measles, scarlet fever, and diphtheria. Why then do they continue to be as severe and fatal as ever? Even in our own state the mortality from measles, scarlet fever and diphtheria is quite large.

The following table indicates the number of deaths in Michigan from the four diseases, during the years mentioned, as tabulated by the Superintendent of Vital Statistics:

YEAR.	Scarlet Fever.	Measles.	Diphtheria.	Small-Pox.
1869	252	147	89	42
1870	852	56	121	9
1871	696	67	121	73

As the mortality in these diseases is very much less in proportion than for unmodified small-pox, or even for the number of cases occurring in any given locality where there are more or less unprotected by vaccination, it shows most conclusively that a very large number of persons every year suffer from these diseases; and, so far as I can find, there is no great diminution in numbers year by year, or other evidences of sanitary measures doing very much to prevent these diseases. I am inclined to believe that enlightened methods of treatment and improved sanitary conditions lessen the mortality some; but if small-pox is restrained by these measures, why are not also these other diseases?

Table Exhibiting Deaths from Four Diseases Registered in England in each of the 5 Years 1838–1842, and of the 25 Years 1847–1871.

YEAR.	Small-pox.	Measles.	Scarlet Fever.	*Diphtheria.	YEAR.	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.
1838	16,268	6,514	5,802		1857	3,936	5,969	12,646	1,853
1839	9,131	10,937	10,325		1858	6,460	9,271	23,711	6,606
1840	10,434	9,326	19,816		1859	3,848	9,548	19,310	10,184
1841	6,368	6,894	14,161		1860	2,749	9,557	9,681	5,212
1842	2,715	8,742	12,807		1861	1,320	9,055	9,077	4,517
1847	4,227	8,690	14,697		1862	1,628	9,800	14,834	4,903
1848	6,903	6,867	20,501		1863	5,964	11,349	30,475	6,507
1849	4,644	5,458	13,123		1864	7,684	8,323	29,700	5,464
1850	4,665	7,082	13,371		1865	6,411	8,562	17,700	4,145
1851	6,997	9,370	13,634		1866	3,029	10,940	11,685	3,000
1852	7,320	5,846	18,887		1867	2,513	6,588	12,300	2,600
1853	3,151	4,895	15,699		1868	2,052	11,630	21,912	3,013
1854	2,808	9,277	18,528		1869	1,565	10,309	27,641	2,606
1855	2,525	7,354	16,929	385	1870	2,620	7,543	32,543	2,699
1856	2,277	7,124	13,557	603	1871	23,126	6,293	18,567	2,525

*Included with scarlatina until 1855.

I have copied from the table of the causes of death in England for a series of years the number who have died from the diseases specified, from which it will be seen that measles, which is a mild disease, and with a mortality rarely exceeding two per cent., is charged with destroying from 4,895 to 11,630 persons each year; scarlet fever, whose death-rate is about ten per cent., with from 6,000 to 23,000; whilst small-pox, in the same years, varies from 1,320 to 23,126, which occurred in 1871. The other years, from 1841 onwards, except 1871, show only seven times an excess of 6,000 deaths; consequently the number of cases of scarlet fever and measles are almost always largely in excess of the number of small-pox cases.

That the number of cases of small-pox in a given community for a series of years is much fewer than for a corresponding series of years before the introduction of vaccination, I think no one will attempt to deny. I have already copied a table bearing upon this point, but perhaps it will be as well to refer again to Bohemia.

Before Vaccination.

YEARS.	POPULATION.	DEATHS.		Proportion of Deaths Generally to Population.	Deaths from Small-Pox to Population.	Deaths from Small-Pox to Total Deaths.
		Total Number.	From Small-Pox.			
1796 to 1802—Average.	3,039,722	94,955	7,663	1:32	1: 396	1:12⅓
After Vaccination.						
1832 to 1855—Average.	4,248,155	131,412	287 7-24	1:32⅓	1:14,741	1:457

In the German army vaccination and revaccination are compulsory. According to statistics collected by German authorities, the German army, which numbered a million of men during the war with France, lost only 286 men by small-pox, while the French army lost nearly 26,000 by that disease. Further evidence in this direction seems to me superfluous.

In consequence of the often imperfect performance of vaccination, or as already spoken of, the limitation by age of the protection afforded, revaccination has been and is most successfully made use of. That it is always *necessary* I am not prepared to admit, but that it is always *advisable*, in view of my own and others' experience, I certainly affirm. Nor is this any objection to the protective value of vaccination. A single attack of scarlet fever, measles, or of any of the infectious diseases, including small-pox itself, is not a positive and unvarying preventive to a second attack, and it therefore should not be expected that vaccination can do more than remove the liability for the time being. But because revaccination may be practiced to supplement an imperfect primary vaccination, there should be no laxity in the performance of the primary operation. The earlier and more thorough the vaccination is performed after birth, the greater the security, and it is even more than probable that an imperfect or badly performed primary vaccination prevents a revaccination from giving as great a protection as may be necessary, and consequently exposes such persons to a greater risk than is expected. The great aim is to vaccinate well in infancy. This should be looked upon as the sheet anchor. And to secure this result every parent should look upon it as a duty to employ the services of a competent vaccinator, who should personally examine the child as to its fitness for having the operation performed, perform it as early as prudent after birth, and then note the results. If in every way satisfactory, typical scars will remain as evidence. If unsuccessful from any cause, repeated trials should be made until either successful or presumptive insusceptibility be established. And although the operation of vaccination is a simple one to the initiated, it should not be considered that any one is competent to perform it. The cutting with jack knives and the insertion of lymph by saturating a piece of cotton with lymph and drawing through an opening in the skin, or the practice of scratching with pins and then rubbing on virus, or other coarse and unscientific methods of performing the operation, are to be deprecated.

The English vaccination law requires every child to be vaccinated before becoming three months old. Our sanitarians recommend it to be performed before the child attains the age of two years. I consider the English requirement the better, as the greatest susceptibility exists in the first year of life, and if attacked with small-pox the risks of death are proportionally greater. Of a thousand deaths from small-pox at all ages previous to the use of vaccination, about eight hundred would be under five years of age, and of this number two hundred and fifty would be less than one year old. This shows that the risk is greatest at a time when many persons think no danger exists, and proves the wisdom of the English law.

"Especially as regards the quality of vaccine lymph, the careless or uneducated vaccinator is using a dangerous weapon. It is only during a part of the course of a vaccine vesicle that its lymph is suitable for further vaccination; for after a given moment at which the contents of the vesicle possess their maximum

of simple contagiousness, they tend more and more toward the quality of common inflammatory products; and matter now taken from the vesicle is no longer the simple agent of a specific infection, but both has less efficiency for its real purpose, and is specially able to produce other undesired results." The imperfect vesicle or an accidentally ruptured one, or by any other means a more than usual inflammatory action induced in an otherwise normal vesicle, are liable to produce unwished for results. The manner of preserving lymph may also sometimes be a reason for the occasionally troublesome sores following vaccination. The scab so commonly used is only dead organic matter containing within it the specific lymph. This dead matter is liable to putrefactive changes under the influence of heat and moisture, and if used after such change the vaccination could hardly be more useful or less dangerous than an ordinary scratch inflicted in the dissecting room. The most efficient, and also least liable to complications, method of vaccination is to use the lymph as directed by Jenner, on the eighth day of a normal vesicle from a healthy child or heifer. As there are difficulties in the way in this country, especially in smaller towns and rural districts, of vaccinating from arm to arm, it becomes necessary to use lymph that has become dried and preserved for a short time at least. By puncturing the vesicle on the eighth day and taking up the exuded lymph on quill slips or pieces of glass the end may be attained. But as there will always be a lurking suspicion in the minds of some as to the possibility of some other contagion being introduced at the time of vaccination, it will be best to use the lymph obtained from vaccine vesicles produced from the heifer. The practice of inducing the disease in heifers is now carried on in several States, the matter being first introduced into this country by Dr. Henry A. Martin, of Boston, from the lymph obtained from what is known as Beaugency stock in France. This can readily be obtained by any medical practitioner, and obviates the risks before spoken of.

Dr. Walton, Cin. Clinic, summarizes at the close of an article on animal *vs.* human lymph as follows·

1. It is certain that humanized virus procures immunity from small-pox for a number of years.	1. It is certain that bovine virus procures immunity from small-pox for a number of years.
2. It is certain that humanized virus may convey syphilis.	2. It is certain that bovine virus cannot convey syphilis.
3. It is possible that humanized virus may convey other diseases.	3. It is not probable that bovine lymph conveys any disease.
4. It is probable that humanized virus degenerates.	4. It is not probable that bovine virus degenerates.
5. It is certain that many persons oppose humanized vaccination.	5. It is certain that very few persons will oppose bovine vaccination.
6. It would not be right to compel vaccination with humanized virus.	6. It would be right to compel vaccination with bovine virus.

That vaccination is worthy of the confidence it enjoys in the minds of the medical profession and of the public generally, is to my mind as positive as any well established truth can be. And also that any parent who willfully neglects to have his child vaccinated, not only exposes said child to a not remote possibility of contagion from small-pox, but also maintains by that neglect a possible

center for infecting his neighbors. A compulsory law in this country would, however, be a dead letter, as our prohibitory liquor law has been; and even were provisions made in such a law for its enforcement by special agents appointed for the purpose, it would be almost impossible to carry them out; and evidence is not wanting that even in Germany evasions are not unknown. For these reasons I would not favor a compulsory law, but hope that all people will investigate for themselves and that an enlightened public opinion shall demand for its own welfare, not by compulsion, but by enlightenment, an early vaccination of all infants.

REPORT

OF AN

EPIDEMIC OF SCARLET FEVER

At North Lansing, Michigan, in 1875-6.

By O. MARSHALL, M. D.,

LATE MEMBER OF THE CITY BOARD OF HEALTH.

AN EPIDEMIC OF SCARLET FEVER.

LANSING, MICH., JULY 8, 1876.

Dr. H. B. Baker, Secretary State Board of Health,

DEAR SIR:—In compliance with your request, I have filled the blanks furnished with the name, age, sex, date of attack, and result of each case of scarlet fever which has occurred in the north half of the city of Lansing, Mich., for the sixteen months from January 1, 1875, to May 1, 1876.* But fifteen cases were reported to the Board of Health for the southern half of the city in the same time.

The accompanying map will show the location of the houses where the disease occurred, with the number of cases and deaths at each, and their relation to surrounding objects which might have an influence on the disease.

In the year 1874 there were few, if any, cases of scarlet fever in the northern part of the city, but there were many cases of the disease in the country adjoining on the north and west. Two cases were reported in the city on the first day of January, 1875, one on Liberty street in the First Ward, and the other near the foot of Washington avenue in the Fourth Ward.

In these two localities it continued in a mild form during the winter and spring months, nearly disappearing in the warm months of summer, to return again in the fall in the same localities, and raged with great malignancy in the months of November and December, and finally disappeared from this part of the city about May 1, 1876; no new cases having been reported since that date.

*This valuable report of details of 160 cases of scarlet fever, is filed for future reference and use in the office of the Secretary of the State Board of Health.—H. B. B., Secretary.

PORTLAND ROAD
SEAGER ST
D.L.& L.M. R.R.
FERRIS ST.
NORTH ST.
BEAVER ST.
PEARL ST.
CLINTON ST.
LIBERTY ST.
FRANKLIN ST.
WILLOW ST.
ODD FELLOWS INSTITUTE.
MAPLE ST.
WALL ST.
WATER ST.
KILBOURNE ST
JEFFERSON ST.
MADISON ST.
SAGINAW ST.
LAPEER ST.
GENESEE ST.
SHIAWASSEE ST.
ASH ST.
MOUNT MORROE ST.
OLD BRICK YARD
TURNER ST
CAPITOL AVE.
WASHINGTON AVE
CENTER ST.
SEYMOUR ST.
CHESTNUT ST.
PINE ST.
SYCAMORE ST.
WALNUT ST.
GRAND ST
CEDAR ST.
LARCH ST.
L.S. & M.S. R.R.
GRAND RIVER
BRIDGE
DITCH
SCHOOL
HIGH SCHOOL
FACTORY OF
ADAMS
STAGNANT WATER


MAP OF THE
Northern Part of the
CITY OF
LANSING
MICHIGAN,
Showing Location of the Scarlatina Epidemic of 1875-76.
SCALE 60 RODS TO THE INCH.
N
W
E
S
J. L. & S. R. R.
CASE ST.
BALLARD ST.
HIGH ST.
DITCH
POND
SHERIDAN ST.
MAY ST.
EAST ST.
OLD CEMETERY
PENNSYLVANIA AVE.
EXPLANATORY MARKS.
First Cases of Scarlatina.
Scarlatina.
Scarlatina Recurred.
Typhoid Fever.
Scarlatina and Typhoid Fever.
Cerebro-Spinal Meningitis.
Each Cross attached indicates a Death.
Figures indicate Number of Cases in each house.
Dotted Line, boundary of Malignancy.
Ponds, Marsh, Wet and partially Drained Land.
Drawn by O. Marshall, M. D., Lansing, Mich.
Engraved by Michigan Engraving Co., Detroit.

The total number of scarlet fever cases given for the sixteen months was one hundred and sixty. Of this number twenty-four died. There seemed a greater tendency in females than in males to contract scarlet fever, and the proportion of deaths of females over males was still greater. Of the whole number of cases ninety-nine were females and sixty-one were males, and of those who died seventeen were females and seven were males.

These facts are shown to better advantage in the following tables:

TABLE I.—*Exhibiting by Sex and Age the number of Cases of Scarlet Fever in the north half of the city of Lansing, Mich., for each month from Jan. 1, 1875, to May 1, 1876.*

MONTHS FROM JANUARY 1, 1875, TO MAY 1, 1876.	Age, in Years and Periods of Years.																Total All Ages.				
	Under 6 mos.		1 to 2.		2 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 25.		25 to 30.		30 and over.				
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Both Sexes.
January	---	1	---	---	1	2	1	2	---	---	---	---	---	---	---	1	---	---	2	6	8
February	---	---	---	---	---	---	---	1	1	---	---	1	---	---	---	---	---	---	1	2	3
March	---	---	---	---	1	2	2	1	2	1	1	1	---	---	---	---	---	---	6	5	11
April	---	---	---	---	---	1	1	2	1	1	---	1	1	---	---	---	1	1	4	6	10
May	---	---	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	1	1
June	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	1	1
August	---	---	---	---	---	1	---	1	---	---	---	---	---	---	---	---	---	---	---	2	2
September	---	---	---	1	2	---	1	2	1	1	---	---	---	---	---	---	---	---	4	4	8
October	---	---	---	---	1	---	---	1	---	1	---	1	1	---	---	---	---	---	2	3	5
November	---	1	3	1	1	8	8	10	2	7	1	1	---	1	---	---	---	1	15	30	45
December	1	---	2	2	5	7	6	6	1	4	---	1	---	---	1	2	1	---	17	22	39
January	1	---	---	---	1	1	2	2	---	1	---	---	---	1	---	1	---	---	4	6	10
February	1	1	---	---	1	---	---	---	---	1	1	---	---	---	---	1	---	---	3	3	6
March	---	---	---	---	1	2	1	---	---	2	---	---	---	1	---	---	---	---	2	5	7
April	---	---	---	---	---	1	1	2	---	---	---	---	---	---	---	---	---	---	1	3	4
Total No. of each sex	3	3	5	4	14	25	23	31	8	20	3	6	2	3	1	5	2	2	61	99	160
Total No. of both sexes	6		9		39		54		28		9		5		6		4		160		160

TABLE II.—*Exhibiting by Sex and Age the number of Deaths from Scarlet Fever in the north half of the city of Lansing, Mich., for each month from Jan. 1, 1875 to May 1, 1876.*

MONTHS FROM JANUARY 1, 1875, TO MAY 1, 1876.	Age in Years and Periods of Years.																Total All Ages.				
	Under 6 mos.		1 to 2.		2 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 25.		25 to 30.		30 and over.				
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Both Sexes.
From Jan. 1, 1875, to Oct. 1, 1875	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
October	---	---	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	1	1
November	---	---	---	---	1	1	---	4	---	---	---	---	1	---	---	---	---	---	2	5	7
December	1	---	---	---	1	2	---	4	---	---	---	---	---	---	---	1	---	---	2	7	9
January	---	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	1	---	1	1	2
February	---	---	---	---	---	1	---	1	---	---	---	---	---	---	---	---	---	---	---	2	2
March	---	---	---	---	---	1	1	---	---	---	---	---	---	---	---	---	---	---	1	1	2
April	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---	1	---	1
Total No. of each sex	1	---	---	---	3	6	1	10	---	---	---	---	1	---	---	1	1	---	7	17	24
Total No. of both sexes	1				9		11						1		1		1		24		24

The disease prevailed with every degree of severity, from the mildest form, in which the patient was scarcely confined to the bed, to the most malignant, in which the patient died in a condition of complete prostration, before the appearance of eruption on the surface of the body. All those cases which occurred before October 1st, with one or two exceptions, were *Scarlatina simplex*. After that date *Scarlatina anginosa* was most frequent, with many cases of *Scarlatina maligna*.

In the more severe cases the eruption appeared in patches or blotches, instead of being generally diffused; the *papulæ* were larger and darker colored, resembling those in measles, and were often interspersed with fine pustules. These cases were generally accompanied with diphtheritic deposits on the palate and tonsils, and in some cases the whole mucous lining of the mouth and throat was covered with false membrane. Large abcesses in the neck were very common. Of those who recovered, one person is totally deaf and one has a chronic discharge from the ear, with partial deafness; these are the only exceptions to complete restoration to health.

The temperature of the body in the severe cases was generally high, seldom falling below 104° Fahrenheit during the eruptive stage of the disease, and often reaching 106° and 107°. In those cases where the temperature of the body did not exceed 103°, or did not remain for any considerable time each day above that point, there was seldom any danger, except from exposure to cold, or improper diet; and I believe did as well without medicine as with; but in those cases where the heat of the body exceeded 104°, and did not fall below that point for a number of days in succession, recovery was doubtfnl, and the higher the temperature the greater was the danger and doubtful the prognosis.

In two instances three persons died in one family. In one of these families there were six persons sick, in the other three. The largest number of persons who had the disease in one house was eight, all of whom recovered. The oldest person (No. 24) who had scarlet fever was a female, whose age was 47 years; the youngest person was two weeks old. A female 27 years old died with the disease, five months in pregnancy.

In the first ten months of the year 1875 there were 49 cases of scarlet fever in the north half of the city, 19 males and 30 females, with one death,—a female. In the last two months of the year there were 84 cases, 32 males and 52 females, with 16 deaths,—4 males and 12 females. In the first four months of the year 1876 there were 27 cases, 10 males and 17 females, with 7 deaths,—3 males and 4 females.

The average age of the whole number of persons who had scarlet fever was 8.51 years. Excluding sixteen adults of twenty years of age and over, the average age of the remainder was 6.40 years. The average age of the whole number of persons who died was 7.25 years. Excluding three adults over twenty years of age, the average age of the remainder was 4.70 years.

The average duration of the disease, when death ensued, was nearly eleven days. Two died on the first day, two on the second, one on the third, three on the fourth, three on the fifth, three on the seventh, two on the eighth, two on the thirteenth, one on the eighteenth, two on the twenty-first, one on the thirtieth, one on the thirty-first, and one on the forty-second day. At the cemeteries two were reported as having died of diphtheria, one of pneumonia, one of inflammation of the bowels, one of typhoid fever, and nineteen of scarlet fever.

In the north half of the city there were thirteen cases of typhoid fever, and

two of cerebro-spinal menengitis, in the sixteen months given. In three instances scarlet fever followed typhoid fever in the same house, and in four different houses scarlet fever recurred at an interval of over six months.

The course of the disease through the city was from southwest to northeast, and continued on in that line outside of the city limits; eleven cases not given in this report having occurred in the township of Lansing, which seemed to have a direct connection with those in the city.

The prevailing winds are from the southwest or west. In the two months of November and December of last year, the wind was, during some portion of the day, thirty-two days in the southwest, and six days in the west. The line of travel to and from the business point of North Lansing is on a line with the disease.

The centers of the disease were nearest to the center of business, where the possibility of contact was greatest. The disease commenced on both sides of the river nearest to the public schools, and its extension outside of the city eastwardly was on the main traveled road. The evidence is strong in favor of contagion as being the first cause of the disease as it prevailed here. Eighty-three persons had scarlet fever following other cases in the same houses. Eighteen had the disease after visiting those sick or where persons passed frequently from the sick to those who were well in other houses. In two instances physicians had the disease in their own families after visiting many cases of scarlet fever. In three other instances there was a strong probability that the family physician had carried the disease in his clothes, hair, or breath, because of the remoteness of the cases from others who had scarlet fever, and no precautions having been taken to change his clothing immediately after visiting those who were sick with the disease. Seventeen persons had first symptoms in school, where it can be proven there were persons in attendance who had not fully recovered from scarlet fever.

In the remaining thirty-seven cases the evidence of contagion is not so clear, but in a large proportion of these, on careful inquiry, the source can be traced with considerable certainty.

Further evidence of the contagiousness of the disease might be found in the fact that where complete separation of the well from the sick was rigidly enforced, and every possibility of its being conveyed in clothing was prevented, none took the disease.

That the cause of the disease lingered long in one locality where no means were taken to purify and ventilate houses and clothing, was illustrated by many cases; also that persons who had recovered from the disease were capable of communicating it to others weeks after their recovery. In one instance (case No. 29) a rag peddler, 35 years of age, was taken sick with the disease after gathering rags at houses where they had scarlet fever. In another instance, in the country west of Lansing, two children were taken sick with scarlet fever six days after carrying home pieces of clothing found in a pile of rubbish at a vacant house where there had been a case of the disease six weeks before. In still another instance clothing which was made at a house where there was a case of scarlet fever was laid away in a drawer, for that reason, and was not used until three months after, but without being thoroughly aired; the result was the boy they were put upon was taken with the disease ten days after the first time they were worn; there was no other case in the immediate vicinity of this one at the time. Case No. 155 was taken sick with scarlet fever seven days after sleeping on a lounge at a neighbor's house. Five weeks before, a patient with scarlet fever (case No. 151) occupied this lounge.

Several years ago a widow lady (Mrs. A. C. Adams) living in the fourth ward in this city lost one of her two children with scarlet fever. She closed the house and went on a visit, taking the remaining child with her. Eight weeks after they returned, and the next week after this the second child was taken with the disease; no means had been taken to ventilate the house.

At a house on Larch street, near the old brick yard, scarlet fever occurred three years in succession, as new families occupied the house. After thorough ventilation and purifying, by my advice, there has been no new cases in this house in the past three years, although there was one case in the house adjoining and two cases in a house on the opposite side of the street, last fall. At the same time there were three children in this house who never had the disease.

Case 158 passed the day with his mother at a house on Pearl street where there were three cases of scarlet fever five months before. Nothing had been done to purify the premises; result,—this boy had scarlet fever seven days after the visit.

A family moved into the city after the disease had nearly disappeared and visited only at a house on the opposite side of the street where a child died with scarlet fever five months before. The only child (case No. 156) of the new family soon had the disease.

A family living on Liberty street went on a visit five miles in the country five weeks after their two children (cases No. 1 and 3) had recovered from scarlet fever; these children were washed and dressed in clean clothes; the next week after their visit the only child in the family visited (S. W. Downer's) had the fever. There was no other case of the disease nearer than the city at that time.

A teacher in a school west of the city watched one night with a family where there were several persons sick with scarlet fever and went directly from this house to her school, which was four miles away. Before commencing in the morning she sat down beside a small boy and assisted him with his lessons. Eight days after I was called to see this boy professionally and found him sick with scarlet fever, and on inquiry learned these particulars; four other cases of the disease followed this one in the same family.

In the family of Stephen Slaight, who resided on Willow street in the Fourth ward, a young man by the name of Frank Riggs assisted Mrs. Slaight to take care of her children during their sickness with scarlet fever. The last one sick died February 4th, 1876. Three weeks after that date the young man went home to his father's house, near the Agricultural College farm, nearly four miles from the city. While at home he wore the same clothes he had on while taking care of the Slaight children. One week after the first day of his visit at home the youngest child in his father's family was taken sick with the scarlet fever. This child was often held by him on his knee while there, before it was sick.

Seven members of the family of Rev. J. J. Moll, who resides in the parsonage adjoining the German Lutheran church on Saginaw street, had scarlet fever in the months of November and December of last year, one of whom died. The funeral services of three of Mr. Charles Baier's family, who died in the months of October and November, were held in this church, and the bodies were taken there for inspection by the friends. Rev. Mr. Moll visited the sick in Mr. Baier's family before his own family were taken sick. The distance between the residences of the two families is about three-fourths of a mile.

In the spring of the year 1874, a child of Mr. Truman Ingersoll, who lives on the Portland road, six miles from this city, was taken sick with scarlet fever,

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as I thought, although there was no eruption on its body at the time. I was positively informed that no person except the family had been there, and none of the family had been away from home in the last three weeks preceding the attack, and that there were no other cases of scarlet fever in the neighborhood at the time. After this the eruption appeared, and all doubt as to the nature of the case was removed. While treating the child a relative of Mr. Ingersoll's left word for me to leave more of the same kind of medicine I had given them for their child's sore mouth and throat two weeks before. Farther inquiry brought out the fact that this child had been at Mr. Ingersoll's about the same time I had prescribed for it, and had fever while there. It probably had a mild attack of scarlet fever, and communicated it to the other child.

These cases are given because many people were met with who denied the contagiousness of the disease, and even among physicians there was a difference of opinion on this point.

Undoubtedly there were causes acting which favored the development of the contagious principle, whatever that may be, and other causes which produced malignancy.

The water obtained from wells in the northern part of the city is generally poor, and in many cases the wells are only from ten to fifteen feet deep, and filled with surface drainage. Water obtained from a greater depth, in what are called "drive wells," often contains a large per cent. of organic matter. The cause of this arises from the fact that originally this part of the city had a large proportion of marsh or wet land. Considerable attention has been paid to drainage by the city authorities, but in the improvements which have been made the natural water courses have often been obstructed. This was the case last fall in the large ditch, shown on the map, on the east side of Grand river. In the vicinity of this ditch scarlet fever was most malignant, ten cases having died within ten rods of it on either side. The relation which water courses and wet places may have had on the disease are best shown upon the map. Those parts where drainage is deficient are shown as marsh or wet land. Some portions of the year these are comparatively dry, while after heavy rains water stands on the surface, and is sometimes weeks in evaporating away, and in some places stands the year through. During the months of September and October of last year, there was an unusual heavy rainfall, and all of the low places were flooded with water. The per cent. of relative humidity in the month of November was eighty-four, and in the month of December it was ninety, the point of saturation being one hundred. The temperature, with few exceptions, varying but a few degrees above or below the freezing point through the two last months. The average for the two months being 32.27°, Fahrenheit's thermometer, and the extreme range from day to day did not exceed 14.83°. The range of three daily observations did not exceed 11.90°. In the following table is a comparison of the temperature, humidity, and rainfall of the sixteen months before given:

TABLE III.—*Exhibiting Average Monthly Temperature, and per cent. of Relative Humidity; with amount of rainfall in inches, each month for the 16 months from January 1, 1875, to May 1, 1876.*

[From Meteorological Observations at Mich. Agricultural College, by Prof. R. C. Kedzie.]

FROM JANUARY 1, 1875, TO MAY 1, 1876.	Number of Scarlatina Cases Each Month.	Thermometer, Fahrenheit. Mean of Three Daily Observations,—7 A. M., 2 P. M. and 9 P. M.			Per cent. of Relative Humidity. Saturation Point 100.	Rain and Melted Snow, in Inches and Decimals of an inch.
		Average Range.				
		Daily.	From Day to Day—2 P. M. to 2 P. M.	Temperature,—Average Each Month.		
January	8	12.13°	15.13°	12.87°	88	1.809
February	3	20.14°	22.39°	7.99°	94	2.198
March	11	15.48°	16.87°	26.20°	87	1.020
April	10	17.80°	21.20°	41.11°	69	.610
May	1	14.74°	18.23°	65.48°	79	4.460
June		16.80°	19.97°	66.57°	65	1.840
July	1	16.26°	18.94°	69.67°	78	2.420
August	2	16.71°	19.23°	65.48°	77	1.470
September	8	18.67°	22.39°	58.50°	76	2.890
October	5	14.68°	18.23°	42.93°	76	5.810
November	45	11.90°	14.83°	32.96°	84	1.110
December	39	8.58°	11.39°	31.58°	90	2.800
January	10	10.74°	15.71°	30.22°	84	1.630
February	6	12.76°	15.28°	27.64°	82	2.210
March	7	12.84°	14.39°	28.33°	88	4.840
April	4	12.80°	14.47°	43.94°	68	2.080
Monthly average	10.7	13.96°	16.90°	46.55°	78	2.449

Many persons confined in close and poorly ventilated apartments seemed to have a decided tendency to produce malignancy; not only in private houses was this shown, but in the primary departments of the public schools, which were temporarily held in the basements of two churches in the northern part of the city. These school rooms were not entirely above ground, with low ceilings, and insufficient light, and were situated over wet soil, without drainage, and no ventilation, except such as was obtained through open windows and doors. That these schools had some influence in reproducing the disease is evident from the fact that they were closed December 13th until the end of the year, and better means of ventilation put in. From this time the disease rapidly declined. The number of cases of scarlet fever in the months of November and December was eighty-four, while in the next four months following there were but twenty-seven. The number of children from five to fifteen years of age who had scarlet fever in the sixteen months given was eighty-four. Of this number sixty-six attended school in the primary departments.

Every evidence went to show that in this epidemic of scarlet fever whatever cause had a tendency to lower the system or produce an unhealthy condition of the body, made it more liable to take the disease, but whatever the surrounding circumstances were, or how poorly prepared the body was to resist it, whether from disease, age, sex, or bad sanitary conditions, few, if any, had the disease if

perfect isolation was kept up. Many interesting cases occurred in proof of this assertion. In my own family I took every precaution to protect my only child from the disease, always changing my clothing before coming home after attending patients sick with the disease, and never coming directly home after visiting scarlet fever patients. My wife took charge of the clothing, and in the thickest of the epidemic in the latter part of the month of November, she took the disease, the child following with a mild attack ten days after.

In well ventilated houses, when attention was paid to cleanliness of body, clothing, and premises, the disease was almost invariably of a mild type.

The decline of the disease was probably owing in part to the fact that the people became thoroughly alarmed because of the large number of deaths which occurred, and took greater precautions to avoid coming in contact with it. The city Board of Health did all in their power with the limited means and authority at their command to prevent the spread of the disease.

Although the happening of this epidemic makes a bad showing for the healthfulness of the city, it is true that, with this exception, the records show the city of Lansing to be one of the healthiest places in the State.

Of the whole number of cases given, eighty-seven were my patients, seven of whom died. The information with regard to the others was obtained by personal visit after recovery, and is generally reliable.

Respectfully, etc.,

O. MARSHALL,

Late Member Board of Health, 4th Ward,

Lansing, Michigan.

REPORT

ON

CRIMINAL ABORTION.

By HOMER O. HITCHCOCK, M. D.,

PRESIDENT OF THE

STATE BOARD OF HEALTH.

REPORT ON CRIMINAL ABORTION.

BY WHAT MEANS CAN INFANTICIDE BE MORE EFFECTUALLY SUPPRESSED, AND DISEASE AND DEATHS FROM CRIMINAL ABORTION PREVENTED?

At previous meetings of this board certain questions in regard to the possible suppression of criminal abortion were presented from Dr. J. H. Beech and Dr. John P. Stoddard, which, with certain letters from these gentlemen, were referred to the Committee on Legislation.

The following are the questions and letters thus referred:

QUESTION FOR THE STATE BOARD OF HEALTH.

Can any legislation reach that class of persons who teach (and lend means for) the art of abortion? Would it not be effective for a time to stir up the people by attempting to *make it the duty* of coroners to hold inquests in every case of death when there exists the least suspicion of such cause?

Respectfully Yours,

BEECH.

COLDWATER, MICH., May 21, 1875.

COLDWATER, MICH., Aug. 15, 1875.

H. B. BAKER, M. D., *Lansing, Mich., Sec'y Mich. State Board of Health:*

SIR:— * * * * * * * * * * * * * * *

In regard to deaths from induced abortion, it seems to me that if the law made it more explicitly the duty of coroners to investigate all cases of death in which *rumor* or other indices of suspicion point toward such cause, a very considerable check upon the crime might be effected. It might be made an especially punishable offence for any physician, surgeon, or midwife to allow the burial of any patient, or person, in whose death said practitioner had any knowledge or suspicion of abortion having occurred, without having reported the same to an acting and efficient coroner or prosecuting attorney, whose duty it should be to give all of such cases a modest but thorough investigation. Professional persons often have knowledge which they in *false honor* believe that it would be meddlesomeness to reveal, but which they would not conceal in face of the strongly expressed mandates of the law. Owing to the delicate nature of the inquest, it might be proper that a jury for such an investigation should be constituted of less number than in other cases, but selected with greater care, even perhaps requiring the certificate of a Judge of court, or a County Clerk, that each is a proper person to sit in such cause.

If the principle is not considered radically unjust or dangerous (and I do not see how it can be), it would be advantageous to protect the informer by secrecy, as is partially the custom of grand juries.

The name of the informer need not go beyond the first officer, but the information of the criminal courts, by any person that he or she had made a statement of such suspicions to any person qualified to act as a coroner, should be sufficient to arraign such officer for maladministration.

I am no lawyer and have conferred with none in regard to my ideas upon this subject, because I believe that your honorable Board can bring more wisdom and efficiency to bear upon the question. If it is chimerical, it cannot fail to meet deserved oblivion at your hands.

* * * * * * * * * * * * * * *

Yours, etc.,

J. H. BEECH, M. D.

QUESTION FOR THE STATE BOARD OF HEALTH.

Can any legislation be had, or any legal procedures be inaugurated, whereby the abortionist may be convicted and adequately punished, and the secret and terribly prevalent crime of abortion be diminished in society?

Would it not in a great measure accomplish this desirable end if every death of a child before birth,—as occurs in abortion,—should be considered as a sudden and unknown death, and that *it be made the duty* of coroners to hold inquests in every such case of the death of an unborn child, sole reference being had to the death of the child, and not to the condition of the mother. In short, hold that death or murder before birth is as much death or murder as after birth.

Respectfully yours,

JOHN P. STODDARD, M. D.

ALBION, MICH., Sept., 1875.

ALBION, MICHIGAN, Sept. 23, 1875.

HENRY B. BAKER, M. D., *Secretary of the State Board of Health.*

MY DEAR DOCTOR:—I had intended to have written long ago to you in regard to that question for the State Board of Health, but press of business and ill health have hitherto forbid. Enclosed you will find the same as I had conceived it. The more I reflect upon it the more do I think my position tenable, especially if our statute laws concerning abortion could be so amended as to consider the person or persons who bring on abortions, no matter at what age of the fœtal life, as guilty of murder. But even as the law now is, if medical men generally,—and then soon the public would do the same,—would consider the killing of a child *in utero*, at any age of the same, as much a crime as they would after birth, then there would at once be seen the same propriety in calling the death of the child *in utero*, as occurs in abortion, a sudden death, and also the same propriety in calling for the sitting of a coroner's jury over the same, as we now consider in a child after birth who is found suddenly dead. The matter of birth I consider to be only one stage in the progressive and unfolding life of each individual, and death before birth or after, is as truly death in the one case as in the other. The time is the shifting element, the accident, if you please, while death is the one constant and main fact, which time cannot eliminate, and should not be allowed to cover up. Thus the killing of the child, in my idea, while yet unborn, is as much murder as when killed in the mother's or nurse's arms.

To my mind the crime of taking the life of a child while yet in its mother's bosom, while yet connected to her and developing life out of her life, while yet in "the workshop of nature," has a touch of greater crime and heinousness about it than the murder of a person at mature strength. It interferes with God's laws more nearly at the fountain; it is a breach of the confidence imposed upon humanity; it is a cowardly attack upon a life left wholly and implicitly in the care and protection of another being. I might enlarge upon this point, but I guess you see my point.

I should be glad to hear from you at at any time,

Truly yours,

JOHN P. STODDARD.

H. B. BAKER, M. D., *Lansing, Michigan:*

DEAR DOCTOR:—Your favor of yesterday is before me and considered. I cheerfully accept the plan of Dr. Stoddard, as intimated by you, in reference to still-born children when the mothers are or have been living with husbands within the "period of incubation," but in other cases as criminality in degree must have been incurred, the supposition would be strong enough to fix the case in proper line for legal investigation.

* * * * * * * * * * * * * * *

Truly yours, etc.,

J. H. BEECH,
Coldwater, Mich.

October 22, 1875.

Among all the nations of antiquity there has prevailed to a greater or less extent the horrid custom of exposing new-born children, or of putting to death, not only the new-born, but even older, children. Sometimes they were strangled, sometimes immolated, sometimes drowned or buried alive, and sometimes thrown to wild beasts or voracious reptiles.

These innocent victims were among some nations sacrificed to their gods, in barbarous but religious ceremony; while among others their destruction was required by law, if, upon a legal examination, they were found to be weak or deformed; and among others still the custom was encouraged lest the population should increase too rapidly. "This practice," says Dr. Beck, "was not upheld merely by the sanction of law, it was defended by the ablest men in Greece. Aristotle, in his work on government, enjoins the exposure of children that are naturally feeble and deformed, in order to prevent an excess in population." He adds: "If this idea be repugnant to the character of the nation, fix at least the number of children in each family, and if the parents transgress the law, let it be ordained, that the mother shall destroy the fruit of her body before it shall have received the principles of life and sensation." *

This custom was by no means confined to the low, ignorant, and degraded nations, but, "when the Roman empire was at its highest pitch of grandeur, the destruction of infant life, in all its various stages, was practiced by high and low—rich and poor. Abortion was perpetrated, and children were exposed, almost without censure—certainly without punishment." †

The Jews, while continuing steadfast, faithful in their own religion, were free from these crimes. Indeed, abortion and infanticide were not forbidden, because unknown among them. ‡

But when they became idolatrous through their intercourse with the Philistines, even the Jews offered up their infant children in sacrifice to Moloch, and Tophet was made horrid by these practices. But to the pure Jewish religion, as well as to real Christianity, infanticide after, as well as before birth, was abhorrent. Tertullian, as quoted by Dr. Beck, says: "Christians now are so far from homicide that, with them, it is utterly unlawful to make away with a child in the womb, when nature is in deliberation about the man; for to kill a child before it is born, is to commit murder by way of advance; and there is no difference whether you destroy a child in its formation or after it is formed and delivered; for we Christians look upon him as a man who is one in embryo."

And wherever Christianity has been introduced among modern heathen nations, infanticide has at once ceased to prevail and has been forbidden under severe penalties. Abortion too, has been, and is, held to be a crime of equal enormity among all persons who have really learned and accepted the principles of the Christian religion.

But notwithstanding the custom of exposing or killing children *after birth*, for any cause, has fled away from every nation before the advance of these pure and benignant principles, and the act is now considered everywhere under the sway of Christianity as murder the most heinous, yet there still remains a shadow of the false philosophy and the ignorance of the laws of life, which prevailed among the ancients.

* Beck's Medical Jurisprudence, Vol. 1, p. 376.
† Beck's Medical Jurisprudence, Vol. 1, p. 379.
‡ Beck's Medical Jurisprudence, Vol. 1, p. 372

Many a nominally Christian home is desecrated by child-murder, by abortion being procured in the early months of pregnancy. Many a nominally Christian mother, who would be horrified by even the thought of strangling the babe upon her breast, and would refuse to produce miscarriage upon herself after the fifth month of pregnancy, nevertheless readily consents to an abortion being produced before the fourth month, and, if her "conscience is not wholly void of offense," yet she considers the act, if not justifiable, at least venial.

Whence comes this *impression,* if *not conviction,* that is so widely spread among even Christian people, and which *excuses,* if not *justifies,* so many child murders in our land, and which furnishes so large and so tempting and so comparatively safe a field for so many devilish-minded abortionists to labor in?

Does it not come directly from the false philosophy and the ignorance of the true laws of life which prevailed among the ancients? And is it not perpetuated and justified by the laws even of Christian lands which to some degree were molded by, and and which now perpetuate that ignorance and false philosophy of the ancients?

In discussing the question when the fœtus is to be considered as endowed with life, Dr. Beck says: "In reviewing the various opinions which have been advanced on this subject at different periods, it will abundantly appear that too often fancy has usurped the prerogative of reason, and idle speculation been substituted in the place of rational investigation. The consequence has been that doctrines have been promulgated, not only the most erroneous and absurd in their nature, but the most dangerous in their tendencies to the best interests of society."*

"The ancients believed that the sentient and vital principle was not infused into the fœtus until some time after conception had taken place." "According to Hippocrates, the male fœtus became animated at thirty days after conception; while the female required forty-two." "The stoics believed that the soul was not united to the body before the act of respiration, and consequently that the fœtus was inanimate during the whole period of utero-gestation. This doctrine prevailed until the reign of Antoninus and Severus, when it gave way to the more popular sentiments of the sect of the *Academy,* who maintained that the fœtus become animated at a certain period of gestation." This erroneous idea crept into the "*canon law* of the church of Rome, which also distinguished between the animate and inanimate fœtus," in their punishments for its destruction. "Galen considered the animation of the fœtus to take place on the fortieth day after conception." "Another contended that eighty days were requisite for the animation of the female, while only forty were necessary for the male." Others again made a distinction between the imperfect embryo and the perfectly formed fœtus, and considered abortion of the latter only as a crime deserving the same punishment as homicide; a distinction of which it is justly remarked by a celebrated writer on medical jurisprudence, 'ennemie a la morale et de l'humanite digne de l'ignorance et des préjugés de ses auteurs." "All the foregoing opinions," says Dr. Beck, "wholly unsupported either by argument or experiment, might be dismissed without a comment, were it not to point out the evils to which they have given rise. It may be said of them with perfect truth that their direct tendency has been to countenance, rather than to discourage the destruction of the fœtus, at least in

* Beck's Medical Jurisprudence, vol. I, p. 404 to 408.

the earlier months of pregnancy. On a subject of this nature, it was to be supposed that legal decisions would be influenced in a great measure by the opinions of philosophers and physiologists; and accordingly, while the delusion of the stoics continued its sway, the law could view nothing very criminal in wilful abortion."

"In times more modern, an error no less absurd, and attended with consequences equally injurious, has received the sanction, not merely of popular belief, but even of the laws of many civilized countries. The error consists in denying to the fœtus any vitality until after the time of quickening. The codes of almost every civilized nation have this principle incorporated into them, and accordingly, the punishment which they denounce against abortion procured after quickening, is much severer than before. The English law 'considers life not to commence before the infant is able to stir in its mother's womb.'"

Our own statutes upon this subject are based upon the English law and are as follows: Compiled Laws, "(7541.) Sec. 32. The wilful killing of an unborn quick child by any injury to the mother of such child, which would be murder if it resulted in the death of such mother, shall be deemed manslaughter."

"(7542.) Sec. 33. Every person who shall administer to any woman pregnant with a quick child, any medicine, drug, or substance whatever, or shall use or employ any instrument or other means, with intent thereby to destroy such child, unless the same shall have been necessary to preserve the life of such mother, or shall have been advised by two physicians to be necessary for such purpose, shall, in case the death of such child or of such mother be thereby produced, be deemed guilty of manslaughter."

"(7543.) Sec. 34. Every person who shall wilfully administer to a pregnant woman any medicine, drug, substance, or thing whatever, or shall employ any instrument or other means whatever, with intent thereby to procure the miscarriage of any such woman, unless the same shall have been necessary to preserve the life of such woman, or shall have been advised by two physicians to be necessary for that purpose, shall, upon conviction, be punished by imprisonment in a county jail not more than one year, or by a fine not exceeding five hundred dollars, or by both such fine and imprisonment."

"(7544.) Sec. 35. In case of prosecution under sections thirty-three and thirty-four of this chapter, it shall not be necessary for the prosecution to prove that no such necessity existed, or that the advice of two physicians was not given."

It will be seen that these statutes recognize and give a semblance of authority to a distinction wholly unfounded in physiology, irreconcilable with the principles of philosophy, and which leads to acts abhorrent to the principles and pure sentiment of Christianity. "Indeed," says Dr. Beck, "no other doctrine appears to be consonant with reason or physiology, but that which admits the embryo to possess vitality from the very moment of conception. If physiology and reason justify the position just laid down, we must consider those laws which exempt from punishment, in any degree, the crime of producing abortion at an early period of gestation, as immoral and unjust. They tempt to the perpetration of the same crime at one time, which at another they punish with death.

"In the language of the admirable Percival, 'to extinguish the first spark of life is a crime, of the same nature, both against our Maker and society, as to

destroy an infant, a child, or a man: these regular and successive stages of existence being the ordinances of God, subject alone to his divine will, and appointed by sovereign wisdom and goodness, as the exclusive means of preserving the race, and multiplying the enjoyments of mankind.'"

It is well known that under these laws abortions are frequently produced, and in many communities are winked at as no more than peccadillos, and by some persons really defended and encouraged. There are also a set of persons, male and female, who make a secret trade of this business, and do these deeds of blood and murder for paltry gold or dirty "rags," and who almost always go undetected or at least unpunished. This sentiment has settled down, in many communities, as a kind of mildew upon all grades of society.

Such is the condition of society and such the status of this crime, which have prompted from two able physicians of this State the questions presented, and the letters addressed to this board.

The intelligent moral sense of a people is to be at once the basis and the measure of its legislation, upon moral subjects.

If the code of laws are much in advance of the intelligent moral sense of the people, the laws fail to be executed and soon become a dead letter. If the code of laws are much below the moral sense of the more enlightened portion of the people, there is a tendency to dull the moral sense and to lose sight of nice moral distinctions.

Now should we gain anything by the enactment of such a law as is suggested in the question and letters at the head of this article?

It appears to me somewhat questionable, and for the following reasons:

1st. Laws which aim to secure their ends by difficult or doubtful means, are apt to be of partial or questionable utility, or entirely nugatory.

There are many cases of abortion purely accidental. So are many deaths of adults accidental. Coroners inquests are very properly held in the latter cases, but I am sure coroners inquests in the former cases would be repugnant to public sentiment.

2d. Most persons on whom abortion is procured are known only to themselves or their husbands to be pregnant. The deed is wholly concealed as is the body of the murdered fœtus.

3d. If the deed were known to have occurred, and the body of the fœtus were really brought under a coroner's inquest, it would be exceedingly difficult, if not quite impossible by inspection, to determine whether the death occurred from accident, or other natural causes. What signs would be depended upon by a coroner to show that a fœtus—dead in an early month of its existence—over which he was holding an inquest, had lost its life by fell design, or by an unfortunate accident, or a diseased womb which refused to house it longer?

4th. The law suggested specifies that in the coroner's inquest "sole reference should be had to the condition of the child, and not of the mother," while often, in the body of the mother, if it could be searched, would be found the surest, if not the only evidences of guilt, at least by instrumental interference.

The terms "quickening," "quicken," "quick with child," and "quick child," that have been bequeathed to our laws by the old English law, inconsistent as they are with reason and the true principles of physiology, have brought with them and made prevalent some of the most erroneous and unfortunate ideas. There is very generally current among the people the notion

that before a pregnant woman "quickens," *i. e.* before the fourth month of pregnancy, there is no real life in the fœtus, or at least that it is not a "living soul," and that to destroy it is no real crime. Many people, otherwise of good intelligence appear to be entirely ignorant of the first principles of embryonic life, or else smothering their consciences for the time by the vapors of an intense selfishness, make themselves believe a lie.

Physicians, too, are not wanting who really believe this old error, or at least do nothing towards removing it from the minds of their patrons, and in many instances, it is to be feared, too easily excuse themselves for being *particeps criminis* in this work of real child-murder.

I claim that our laws on this subject,—not up to the intelligence of educated people, and not in consonance with reason and the laws of physiology,—are justly chargeable with the general diffusion of this dangerous sentiment, and the general obtusion of the public conscience as to moral distinctions on this subject.

Do not the phraseology of our laws, and the distinctions made by them in the procuring of abortion, before or after quickening, tend to confuse the public intelligence, and to lower the tone of the public conscience, and thus to foster the prevalence of abortion in the early months of pregnancy?

Through this Board, I would respectfully call the attention of jurists and the law-making power of this State to these considerations, and ask if this phraseology of our laws should not at once be changed so as to make it entirely in conformity with the principles of reason, and the laws of physiology.

This change in the phraseology will of necessity carry with it the discontinuance of the distinction in the penalties for abortion procured or attempted before or after quickening. I am sure that our laws thus amended would be approved by the intelligence of our people, and would be a great awakener of their consciences, and would do much towards decreasing the number of abortions in the early months of pregnancy.

I am sure that what the people in Michigan as well as in other States, need in many fields of legislation, is, not so much new and more explicit and comprehensive laws, as the general diffusion of real practical knowledge upon such subjects, and especially the quickening and arousing the conscience already intelligent.

It is right here that much good can be done by physicians and by all hygienists in giving prevalence to the truth, that at the very moment of conception life begins in the fœtus, and that no other time can be named so reasonable when the human fœtus becomes a living soul; and that to destroy it at any time before birth is as much murder as at any time after birth.

That the consciences of the people be aroused upon this subject is quite as much a necessity as that the people be informed upon it. The reality and enormity of the crime need in every suitable way to be pointed out, and made pungent by explicit law and condign punishment.

It is true that at present abortion, especially in the early months of pregnancy is far too prevalent, and that far too few of those who engage in it are brought to punishment.

The fact that abortionists do their deeds mostly in darkness, explains in some degree why so few of them are brought to punishment. But how many whose guilt has been proven beyond a question, have escaped merited punishment by the disagreement of a jury,—a disagreement accounted for by the want of real

intelligence, in some of the jury, of the true laws of life in the fœtus, or the demoralized consciences of others who had perhaps availed themselves of such services in the desecration of their own homes?

Our laws upon this matter, changed as I have suggested, would threaten condign punishment to this crime whenever committed, would tend to give intelligence to jurors now ignorant of the true laws of fœtal life, and would, I am sure, be the strongest and most natural barrier to the commission of this crime.

KALAMAZOO, August 1st, 1876.

REPORT OF ATTENDANCE, ABSTRACTS, AND REVIEW OF THE PROCEEDINGS

OF THE

HEALTH DEPARTMENT

OF THE

AMERICAN SOCIAL SCIENCE ASSOCIATION,

At its Annual Meeting at Saratoga, N. Y., September 8, 1876.

By HENRY B. BAKER,

MEMBER OF THE

STATE BOARD OF HEALTH,

Member of the American Social Science Association, etc.

REPORT OF PROCEEDINGS*

OF THE DEPARTMENT OF HEALTH OF THE AMERICAN SOCIAL SCIENCE ASSOCIATION AT ITS LATE ANNUAL MEETING.

To the President and Members of the State Board of Health:

GENTLEMEN:—The Annual Meeting of the American Social Science Association was held at Saratoga, Sept. 8, 1876. Herewith I respectfully report such items bearing upon the subject of public health, as through my attendance at the meetings of the public health section of the Association, I have been able to gather and write out, and also a few other items and thoughts of my own which occur to me in connection therewith.

Of the nine papers and topics presented and discussed, all but one were on subjects connected with the improvement of the sanitary condition of schools, and of the physical and mental condition of school children. Taking up the subjects in the order presented, there was first, a report upon the "Health of Schools," by D. F. Lincoln, M. D., of Boston, Mass. This included a history of some of the work lately done in this country for sanitary progress in schools, referring more particularly to the labors of those connected with the American Social Science Association. Among the papers mentioned were the following: "Drainage and Privies for Schools," by Frederic Winsor, M. D.; "Contagious Diseases among School Children," by Arthur H. Nichols, M. D., of Boston; "Measurement of the Height and Weight of 25,000 School Children in Boston," by Prof. H. P. Bowditch; "School Architecture," by Dr. D. F. Lincoln; and the "Method by which teachers should ascertain Defects of Hearing in Pupils," by C. J. Blake, M. D., of Boston. The report also stated that the investigations by Dr. Agnew, of New York, and of others, as to the condition of the eyes of scholars, have been continued. Dr. Lincoln's report made favorable mention of the results of sixteen years trial of gymnastic instruction at Amherst College, and stated that the general health of the students has been greatly improved. The mortality had fallen from nine per cent. in the 14 years previous to 1861, to less than five per cent. in the succeeding years. Before attributing all this to instruction and practice in gymnastics alone, I think it should be prominently kept in mind that the lessened mortality has occurred while the students have been under the careful supervision of a medical man. How much is due to gymnastics, and how much to the better care of the health, under the direction of a skillful physician, may be difficult

*The thanks of the reporter are due to Dr. Lincoln, of Boston, for proof slips, etc., and to Dr. Newell, of Providence, for a copy of the Providence "Daily Journal," for Sept. 11, which have facilitated the preparation of this report.—H. B. B.

to learn; but the reduction of the death-rate to about one-half what it was before, is a very important result that should attract attention to the methods employed.

The report mentions the work of members of the Rhode Island Medical Society on school hygiene, particularly the proper age at which children should begin to attend school, and the hours of study. The Hon. William Wood, President of the Board of Education of New York City, has recommended that the minimum age be six years. The New York Medico-Legal Society recommended eight years, and would make three hours the maximum daily attendance for primary pupils.

Dr. J. A. Spalding of Portland, Me., was the author of a paper read giving the result of the examination of the sight of 2,372 primary and grammar school children in that city with reference to the amount of short-sight. In the primary schools the percentage of short-sight was found to be 3½, while in the grammar schools it was increased to 11. Dr. Spalding thinks that in combating the increase of short-sight we should first consider the lighting of the schools, that the building should be placed north and south and have windows on one side only. In teaching music, etc., from printed charts, either the charts should be printed in type large enough to be read across the largest room, or they should be hung about the room so that all the scholars can see without difficulty. Scholars that are short-sighted should be so placed in the room as to have a good light from the side, and, except they wear glasses, should not be forced to draw simply because drawing is taught, or otherwise treated in a way to increase the defect of sight already present.

Dr. Spalding thinks it advisable that short-sighted children should use glasses at an early age, but that such glasses should be carefully chosen by competent persons; that they will then prevent a rapid increase of short-sight, and rest the eye from too much exercise of its muscles of accommodation, but that a strong glass has a tendency to weaken the accommodative power of the eye and to increase the short-sight. Short-sight being often hereditary, parents who have such defect should be particularly careful that their children be taught how to use their eyes so as not to increase but to improve their power of vision. He placed considerable stress upon the teaching of this to children at home, but it seems to me that there is more hope of accomplishing this through the schools than at home, for this knowledge has to be gained before it can be taught to the children, and the prospect of its being gained by the teachers is much better than that it shall be gained by the parents throughout the country. But the teachers are necessarily dependent upon the medical profession for such knowledge as this, and a Medical Inspector and Advisor of Schools is an officer that should now appear and do much toward decreasing numerous ills of life that might be avoided, and very much toward increasing the health and happiness of mankind, by beginning to teach proper modes of life at the very beginning of school life, and continuing to guide the physical training throughout its entire course. Something like this seems to me to be the most natural method of preventing the great army of sickly students—girls and boys—and the deaths of these soon after graduation,—conditions and circumstances now frequently observed.

A paper by Dr. Loring, of New York, was read. Dr. Loring thinks that all children's eyes should be examined when they begin their course, and the method suggested by Dr. Spalding of using type No. 20 at the distance of twenty feet, a good one. During the last year Dr. Loring, assisted by Dr. Derby, has exam-

ined the eyes of about 1,133 scholars of various ages in New York. Each eye was examined separately, first with the test types and then with the ophthalmoscope. Among the primary scholars the proportion of near-sighted eyes was 6.8 per cent; in the intermediate ages it was 11.67 per cent; in the normal scholars it was 26.67 per cent. The proportion of near-sight increases with the age. Far-sight, or hyperopia, begins with 8.3 per cent; in the intermediate age it rises to 20.53 per cent; and at the more advanced ages sinks again to 11.04 per cent. The proportion was greatest among the Germans, 23.23 per cent; next the Americans, 19.35 per cent; French, Spanish and others, few in number, 15.41 per cent; and the Irish 14.22 per cent. Comparing these statistics with those collected in Germany and in Russia, it is found that the proportion of abnormal refraction is much less among the children examined in this country.

A paper by C. J. Blake, M. D., of Boston, Mass., called attention to the importance of recognizing a class of school children for whom special provision in the way of education should be made, and pointed out the method by which defects of hearing should be ascertained. Among children in public schools, out of 8,715 cases of ear disease in which there was impairment of hearing, 25 per cent. were children under 14 years of age. In about 12 per cent. the disease was amenable to treatment. In order that proper allowance be made for defective hearing, it was desirable that children in schools be examined and placed according to degree of disability. Each child should be carefully examined to determine the degree of deafness, tested by the distance at which the voice of the teacher can be distinctly heard in ordinary conversation tone, and again by the pronunciation of consonant tones. In testing different scholars, the teacher or person testing should always occupy the same position, preferably the rostrum or seat usually occupied in school hours, and he should speak in the tone of voice used in the school-room exercises. The child to be tested should be placed in front of the teacher, and at the farthest line of seats, and gradually advanced toward the teacher, the tests being repeated until a place is reached at which the child can hear distinctly, the child being required to repeat distinctly the test words or tones employed. The child should not occupy a place in the school-room more distant from the teacher than the one thus found. The paper strongly recommended the establishment of a medical supervision of schools, the officer to devote his whole time to the duties of the position, and to be a competent physician who had thoroughly studied school hygiene.

The next paper was by Dr. J. M. Gregory, President of the Illinois Industrial School, formerly State Superintendent of Public Instruction in Michigan. The paper was an interesting general discussion of the subject of "Half-time schools," and contained valuable suggestions and testimony of teachers on the advantages of short time schools.

T. Newell, M. D. of Providence, Rhode Island, then read an excellent paper on the same subject, dealing with it in a definite and pointed manner, and from a physiological standpoint. Starting out with the idea of learning the length of time that children of different ages are able to fix their attention, he availed himself of the results of the labors of Edwin Chadwick of England, and of others, who have found that the capacity of the mind for attention grows with the body, and is increased by cultivation; that very young children can receive lessons of one or two minutes length, that with increasing growth and cultivation the capacity for attention is increased to five minutes, then to ten, then to fifteen minutes, at the age of ten years to about twenty minutes, at twelve

years to twenty-five, and so on. It has been found that for children aged ten or twelve years, the capacity for bright and voluntary attention is exhausted by four varied lessons, requiring mental effort of half an hour each with intervals of relief, in the forenoon. In the afternoon this capacity is reduced one-half. These are statements of averages; a skillful teacher, good ventilation, proper lighting and warming of the room, more than ordinary stamina of children, etc., may increase, while opposite conditions will reduce the length of time that the attention will be profitably fixed on lessons. The general statement is that two hours in the forenoon and one in the afternoon is as long a time as children can be profitably employed in school.

At first thought, it might seem that keeping children at school for a longer time than that during which their attention could be held would only result in simply a waste of the extra time, and that not very valuable; but Dr. Newell points out the fact that its results are much more serious; that the long application is mentally injurious, produces weariness and disgust of subjects taught, tends to form dilatory, diffused and slow habits of thought, and is productive of indecorum and truancy. His belief is that children will not simply learn as much in the three hours as they will in the six usually forced upon them, but that they will actually learn more, because of the greater aptitude for prompt, vigorous and sustained industry. He claims that the "half-time" system, as it is called, will tend in many ways toward improving the health of children, and of teachers, that now suffers from the unnaturally prolonged restraint of body and mind in rooms that become foul with the accumulated emanations from overcrowded inmates. By this change the air of the school rooms would be much more pure, and this, in connection with the improved condition of the scholars, would tend to lessen the spread of contagious and infectious diseases so frequently due to aggregation of scholars in close ill-ventilated rooms. The extra time can be profitably and healthfully utilized for physical training or industrial employment.

He thinks there is unquestionable testimony that a child will learn more in the "half-time" in connection with physical or industrial training, than under the usual present method. Children relish physical exercise after attention to studies, and study with more spirit, energy and success after such exercise. He thought the subject of even greater importance to the welfare of the girls than of the boys at school.

Dr. Newell's paper was listened to attentively, and was followed by enthusiastic remarks by Mr. J. M. Barnard of Boston, and others. In the course of his remarks Mr. Barnard said he did not see how the health of children in schools, or their physical education and training, could receive proper attention in schools until those who control them secure the aid of the medical profession, or of skillful sanitarians, and bring to bear upon these questions the special knowledge which that profession has and can accumulate.

Dr. Richard J. O'Sullivan, of New York City, and formerly a Medical Inspector of Schools, then read a paper on "The Prevention of Contagious Diseases among School Children." This paper also favored the short-time system, on the ground that such diseases are less likely to be spread by the short than by the longer use of rooms where, as is usually found in school rooms, the air space is not great. The other parts of the paper were interesting, but somewhat difficult to do justice to in an abstract.

D. F. Lincoln, M. D., of Boston, Secretary of the Public Health Section of the American Social Science Association, read a paper on, and exhibited plans

illustrating, the subject of "Sanitary Requirements in School Architecture." The plan exhibited was of a grammar school for about 550 pupils. He thinks that, as a general rule, it is not best to plan for more than 600 in one building; that a large building is not easily kept in good sanitary condition; that placing four stories, one above another, almost always insures poor ventilation. At least as much ground as the building covers should be reserved for a play-ground, and be so disposed as to give free space on all sides. The land must be well drained,—if not naturally so,—it should be underdrained to the depth of the cellar. The school should not be near ponds or stagnant water; nor foundries, railway stations, or other noisy establishments; nor shambles or other offensive places. No room for regular study should be placed in a story of which any portion is under ground. The first floor used for such room is to be at least four feet above the street grade. The story under this may contain play-rooms and gymnasium, provided these face the sun, and the slope of the land leaves the wall entirely above ground on their side of the house. Good drainage, and an uncontaminated water-supply should be carefully secured. Walls are to be wainscoted to the height of 2½ feet in rooms, and 4½ in entries. They should be made as impervious as possible so as not to absorb exhalations of lungs and skin of the scholars. The doors must open outwards and be from 8 to 12 feet wide. One must be near, and, if possible, opposite the foot of each staircase. A school for 600 should have two stairways, each isolated, if possible, by solid brick walls. Balusters are then superfluous, the hand-rail should be about four feet above the riser. One or two landings are desirable to break each flight. Wedge-shaped steps and spiral stairs are not admissable. The stair-cases must be from six to eight feet wide, and well lighted. Entries and corridors should be spacious, particularly at the foot of stairs; they should be warmed, and should be lighted directly from out of doors.

For convenience of visitors the master's parlor should be not above one flight from the street. Other needed rooms are a great hall, and this may sometimes be used in recess-time, and rooms for library, cabinet, and instruments. Each school-room should have a clothes closet having one door into the entry, and if convenient, another into the school-room. The teacher should have a private closet. Two stories of school rooms are all that can usually be permitted; a third story, or portion or a story, may contain the great hall; but no class of girls, at all events, ought to have to climb two flights from the street.

It is hard to comply with the sanitary requirements if more than about forty pupils are allowed to each teacher. The room should be oblong in the proportion of about four to five. The voice is best heard in such a room, the teacher sitting near one end.

The room should never be lighted from in front of the scholars, but always from their left hand. The windows should open directly from the outer air and move easily in the frames. Window-sills should be at least four feet above the floor, because light entering at the level of the eyes only dazzles, and is useless for illuminating the tops of desks. The tops of windows should come within eight inches of the ceiling, which can be effected by the use of iron beams. This illuminates the ceiling, an important source of light. The ceiling should always be white; walls may be tinted, but no wall-paper should be allowed. The blackboard should never be on the same side as the windows. The door should open directly into the entry, and had better be near the teacher's desk. The room should not be less than 12½ feet, nor more than 14 feet, in height. Each pupil should be allowed at least 250 cubic reet of air space.

Prof. Kedzie says 300 cubic feet. A system of foul air flues, two for each room, and provided with powerful suction from a centrally heated shaft, is the only satisfactory way of getting rid of the foul air in cold weather.* Fresh air should be introduced not much above the temperature of the rooms. Dr. Lincoln thinks the proper temperature of the room is probably 65° F. It seems to me important that the level for which the temperature is stated be mentioned, or that an equable temperature be required. In rooms where only mental labor is to be performed in a sitting posture, it seems to me that the temperature at the floor level should not be below 65° F., nor should the temperature at the level of the head exceed 70° F. In a room where all the scholars stand, or have other muscular exercise, the temperature may be less.

Dr. Lincoln's very valuable paper contained much of interest that can hardly be conveyed in a brief abstract like this.

The last paper was by Prof. Robert T. Edes, M. D., of the Harvard Medical School, Boston, Mass., and was on "Alcohol as an article of Diet." Perhaps it might as well have been entitled, "Alcohol as an article of Medicine," for the writer did not seem to recommend it as an article of diet for persons in health. A considerable part of the paper related to the experiments of Anstie and others going to show the fate of alcohol in the living body, that it was mainly decomposed. The experiments cited went to show that when moderate doses are given, only about two per cent. of the alcohol leaves the body as alcohol. When extremely large doses are given, leading to profound intoxication, only about twenty-five per cent. can be detected as alcohol; the remainder undergoes change within the body. One effect of the ingestion of alcohol is to lower the temperature of the body, and this may be taken advantage of by the skillful physician in certain cases of disease.

If I may add my own opinion, it is that the public health will gain largely if the people can be brought to consider alcohol as a powerful agent for evil, under its ordinary unskillful use, and that its use, even as a medicine, should not be undertaken except by the prescription of a skillful physician.

*It will be seen that this is the plan recommended by Prof. Kedzie, of this Board. See Annual Report State Board of Health, Michigan, 1873, p. 95.—H. B. B.

WATER, AND THE WATER SUPPLY IN MICHIGAN.

By ARTHUR HAZLEWOOD,

MEMBER OF THE

STATE BOARD OF HEALTH,

AND ITS

Committee on Food, Drinks, and Water Supply.

WATER, AND THE WATER SUPPLY IN MICHIGAN.

This all-important and pervading substance is so prominent among the influences which make or mar our joys and comforts upon this earth, that it often becomes in many ways the object of our thought and labor to court its blessings and avert its evils.

The extent of its presence and the necessity for it to all living organisms belonging to this earth, is truly wonderful. It composes four-fifths of the vegetable kingdom, and three-fourths of the animal, is present in inorganic nature almost everywhere, even to the extent of from 2 to 12 per cent. of the weight of many minerals, and our atmosphere is but a treasure-house for its dissemination. The beautiful phantasies of the clouds are but the visible evidences of its presence.

THE COMPOSITION OF WATER,

as described by the chemist, consists of a union of two elementary substances, to wit: oxygen and hydrogen, combined in the proportions by measure of one part of oxygen to two parts of hydrogen, or by weight, of eight atoms of oxygen to one of hydrogen. In this state of chemical purity it is rarely seen, being difficult to obtain or to preserve. Water, as we are familiar with it, is the pure water of the chemist, more or less contaminated by other substances, varying in quantity from the almost absolute purity of some lakes,—notably Loch Katrine in Scotland, which contains but two grains of solid matter to the imperial gallon,—to the refuse water of our homes and manufactories, that we are so anxious to get rid of.

THE QUANTITY OF WATER REQUIRED EVERY DAY BY EACH INDIVIDUAL OF OUR RACE

varies with the extent of his desires; but each man absolutely needs in his food about 60 oz. per day; though he may not use any without previous preparation, the basis of his soup, wine, beer, milk and other liquid foods is water, and without its presence in some proportion in what is known as solid food, the same would be hard, unpalatable and indigestible. This quantity, however, is but a fraction of the stores we need for the many ways in which we use water, viz.: for manufactories, for ablution, for washing, for the preparing and cooking of our food, not to mention the luxuries of baths, garden and street sprinklers, and protection from and extinguishing fires. These uses so greatly increase the quantity required that no city or community can be said to be well supplied with a less quantity than 100 gallons to each inhabitant per day. Detroit, for the

year 1875, supplied 107.6 gallons, Bay City 100 gallons, Port Huron* about 35 gallons to each inhabitant per day. New York city receives 100 gallons per head per day, "besides 12,000,000 pumped from tube (drive) wells for the use of factories, etc." The larger cities of Great Britain receive from 30 to 50 gallons to each inhabitant daily. Thus we see that the civilization of the nineteenth century is yet unable to supply good water to the citizens of our largest cities, as did imperial Rome in her day, the amount then considered necessary being from 300 to 340 gallons to each inhabitant per day.

THE SOURCE OF ALL OUR SUPPLIES OF FRESH WATER

is from the atmosphere, which embraces our earth, where it exists as a gas, or vapor, as it is more usually called. By changes in the temperature of the atmosphere the watery vapor becomes condensed, and then the watery particles being too heavy to be held in suspension, are deposited on the surface of the earth, as dew, mist, rain, hail or snow.

Whenever the quantity falling upon the earth's surface is in excess of the ability of the soil to immediately absorb, it runs over the surface and gravitates toward the sea; in its course forming streams, lakes and rivers. Some of the rain-fall passes through the soil and reappears at other points, which are commonly known as springs, or when artificially tapped as wells, flowing then over the surface as rivulets, and joining the surface collections, they together form our lakes and rivers. We may therefore classify the immediate sources of our fresh water supply as rain-water and spring, well, river and lake waters.

Each of these sources causes a variation in the quality of the water supply, in consequence of the absorption of the chemical constituents of the soils, or rocks, through which it has passed, resulting in the water becoming hard or soft.

HARD AND SOFT WATER.

These terms, as applied to water, are so common as not to need explanation; yet to a more thorough appreciation of the different qualities of water, some statements may be necessary. Pure water dissolves soap and readily forms a lather, with but a small quantity. Waters containing minerals in solution, and notably the salts of lime, magnesia, or iron, do not readily form a lather, because these salts form insoluble precipitates with the soap. Therefore, whenever a water feels hard to the touch and does not form a lather with soap readily, it may at once be said to be a hard water. The chemist determines the relative hardness of waters by making a standard solution of soap, and from the amount required to form a lather with a given specimen of water, he determines the number of the degrees of its hardness. Each degree of hardness is equivalent to that produced in a gallon of distilled water, by the addition of a grain of carbonate of lime. An excess of hardness in a water supply for general purposes is objectionable. For washing, the increased quantity of soap required to neutralize the mineral ingredients in the water is expensive and gives trouble. For manufacturers uses it is not suitable, and when used in boilers, the mineral matter is deposited, forming what is known as fur, which not infrequently is the cause of accidents. And in the kitchen it is unsuitable for the purpose of cooking, spoiling the appearance of all green and delicate vegetables, interfering with the cooking of white meats, and the extraction of

*City in part supplied with well water.

the juice of all meats, when boiled. According to Prof. Soyer, an eminent authority, hard water is very prejudicial in the preparation of the better kinds of bread; also for the proper preparing of the cup that cheers but does not inebriate, too hard a water is not suitable.

The hardness of water may be diminished by boiling, by the addition of borax, or soda; or in the case of those containing an excess of carbonic acid and salts of lime, by adding milk of lime, this combining with the excess of carbonic acid, forms carbonate of lime, which being insoluble, except in the presence of an excess of carbonic acid, is precipitated with the carbonate of lime already present, thus making the water softer. The hardness in water remaining after it has been boiled is called its permanent hardness; that lost by boiling, its temporary hardness. A large amount of permanent hardness is objectionable, as it usually depends upon the presence of harmful salts.

RAIN WATER

when collected in the country on clean surfaces is a bright, clear, well aerated, and soft water. It however carries with it from the air ammoniacal salts, sodium chloride, calcium compounds, carbonic acid, and traces of organic matter, so that at the best it usually contains from 2 to 3 grains of solid matter to the gallon,—but in large cities, and especially near manufactories, its solid constituents may be increased both from aerial contamination and from the roofs from which it is collected. As a general thing, rain water is collected in this country only for washing purposes, but whenever from some local cause it is necessary to be used for domestic purposes it should be thoroughly filtered.

Water from springs, wells, rivers and lakes, is influenced in its quality and composition by the geological strata and nature of the soil through which it has passed, or the character of the surface over which it has coursed. It has already from the atmosphere absorbed some carbonic acid, and in the upper soil largely increases the quantity, and thereby becomes enabled to dissolve and decompose many mineral substances, with which it comes in contact, and often becomes so highly charged with them, as to be unfit for ordinary use, as in the case of mineral waters, salt wells, etc.

SPRING WATER

is usually quite clear and sparkling, though it may be quite impure; the soil, through which it has passed, has in a sense filtered it, but, at the same time, the water has absorbed the peculiar nature of the filter, and coming from below the surface, it is usually cool.

Ordinary spring waters contain salts of the alkalies and alkaline earths, most commonly the chlorides of sodium and potassium, the sulphates of soda and lime, and the bicarbonates of lime and magnesia, are held in solution, whilst salts of iron, sulphur, and silica, the substance of quartz, are not infrequent.

Organic matter is also found in spring water, by which is meant substances of undetermined chemical composition, derived from decomposing animal and vegetable substances. Many of the compounds thus occurring as the result of vegetable decomposition, are harmless, and ordinarily spring water is free from the contaminations arising from animal decompositions.

Living organisms are also found in such water, some of them microscopic only, having frightful appearances and motions, but otherwise no more objectionable than fish or plants; the latter are often useful by liberating oxygen, which attacks and destroys dead and decaying animal matters.

Living organisms may, however, be taken into the system by drinking spring water, such as parasitic worms, young leeches, etc., and produce serious and lasting effects.

WELL WATER

is similar to spring water usually. In shallow or surface wells, however, an amount of surface drainage is always present, which may be, and often is, a source of great impurity. More especially in cities and large villages, after some years, the well water becomes unfit for use, because of the drainage from cesspools, stables, and other sources of impurity in the neighborhood; and further, the habit of many, in new countries, of curbing up wells in whole or in part with wood, is a serious source of danger; the wood becomes rotten, where it is at times out of the water and again saturated, and speedily are fungous growths engendered, which are poisonous in their effects upon the human system. Open wells too are exposed to the danger of small animals falling into them and drowning, giving rise to the most objectionable form of poisoning by animal decomposition. Tube or drive wells are often used, but they are no better than others as a protection from contamination by surface drainage, especially when placed near to cesspools, stables, or cemeteries. Whenever they are made so deep as to pass through a stratum of impervious clay, or hard pan, the supply of water being drawn from beneath, they partake more of the nature of artesian wells, and although protected in a great measure from surface drainage, are apt to be too highly charged with mineral matters to be a serviceable water for ordinary use. Occasionally, however, artesian wells are very useful, and supply a very pure water, one at Grenelle, near Paris, 1798 feet deep, furnishes 900,000 gallons per day and is made a part of the supply to that city. Artesian wells in London may be sunk to the layer of chalk, underlying that city, and furnish excellent water.

RIVER WATER

is usually softer than spring or well water, but contains more organic matter. As a large part of the water in rivers is derived immediately from the rain-fall by surface drainage of the neighborhood, it has not had an opportunity to dissolve much inorganic impurities, but largely of organic. In some rivers large quantities of mud are held in suspension. This, unless the current is very swift (as in the Mississippi, Ganges, and some other rivers), is gradually deposited, and is not objectionable, except when no time can be allowed for it to settle before using. Small rivers flowing through cities, or near large towns, and which are used to convey the drainage to the sea, are apt to become offensive from filth accumulations, and therefore unfit as a source of water supply. Saginaw City is an instance in our own State, the water being taken from the river, near to the point of discharge of main sewers. It is but just, however, to the authorities of that city, to state that they had intended this water to be used only for sprinkling, and for extinguishing fires, but in this they were unwise, as in many instances strangers and even residents are ignorant of these intentions, or fail to remember them, when an urgent need for water arises.

Michigan is nearly surrounded by immense bodies of water, which, although it receives the sewage of many cities and other sources of impurity, is yet, at a distance from the shore, a good potable water. The infinitessimal proportion of contamination, as compared to the whole body of water in the lakes, the action of oxygen in the water, the aquatic plants and fishes, must perforce

soon reduce the impurities into innocuous substances. And thus Chicago and Bay City, by taking their supply several miles from land, are almost as exempt from water pollution, as if the lakes were not used as cesspools. Chicago was not thus happy before she made her submarine viaduct, for in 1861 it was not unusual for the hydrant water to be quite offensive and even to contain dead fish. Detroit and Port Huron, deriving their water supply from the so-called rivers Detroit and St. Clair, which are really but comparatively narrow connections of the great lakes, having a constant current in one direction, demonstrate to a nicety that water taken from a large running stream, above the point where the sewage of some city enters, is free from contamination, and may be used, if otherwise suitable, for drinking and domestic purposes.

The remarks made by Drs. Christian and Griffin, of Wyandotte, Michigan, are very pertinent in this connection (see answers from correspondents to circular No. 7, published in Report of State Board of Health, 1875), and point to the Detroit river as the only proper source of water supply for that city, besides confirming to a certain extent the teachings of Dr. Lankester, of London. The sewage of one city or district, situate ten or twelve miles up stream from another city or district, will not, providing the stream is sufficiently large and rapid, expose the residents of the down stream district to an appreciable danger from sewage contamination of the water.*

POND AND LAKE WATERS

are good or bad for water supply, dependent upon their location. Our ponds and smaller lakes are essentially stagnant waters, receiving their supplies from springs and surface drainage. They are sometimes very offensive. Others, however, located in high rocky regions, are very free from impurities, and are the best sources for supplies to cities. Some of them in peat districts are discolored, but not rendered otherwise objectionable from this cause.

The citizens of this State (Michigan) for the most part rely upon wells and springs for their water supply; a few only of our cities are as yet supplied by water works. Detroit, Bay City, Saginaw, and Port Huron, are supplied from the lake, or river, upon which they are located; Grand Rapids from a creek, Allegan, Jackson, and Kalamazoo from wells. These cities are, as far as I am aware, the only ones in the State of Michigan that provide by public works a water supply. With the exception of Saginaw City, the cities mentioned are supplied with a good water. From the answers received by the Secretary of the State Board of Health, in answer to circular No. 7, it is evident that throughout the larger part of this State the water obtained from wells is hard, and in many localities objectionable from various causes, either natural or acquired. In quite a number of localities in our State, mineral wells are to be found, some of them of a remarkable character, containing as they do so large a proportion of solid matter to the gallon. Waters from these wells, though often useful as remedial agents, are not the best for ordinary use.

NATURAL IMPURITIES OF WATER.

The natural impurities of water are usually an excess of mineral matters, and it is often difficult to determine how much of this form of impurity may be

*"I cannot agree with Dr. Frankland, that the water of the Thames, after receiving defecated sewage matter, is unfit for domestic use; for, after a large practical acquaintance with the subject, as it is observed in the principal streams and rivers of England, I have arrived at a very decided conclusion, that sewage, when it is mixed with twenty times its volume of running water, and has flowed a distance of ten or twelve miles, is absolutely destroyed; the agents of destruction being infusorial animals, aquatic plants, and fish, and chemical oxydation."—DR. H. LETHEBY, *Medical officer of health for the City of London.*

compatible with health to the persons using the same. A moderate degree of hardness, providing it depends upon calcium carbonate, is not considered detrimental. There is some disagreement in authorities as to the amount of hardness, as determined by soap test, admissible in a good and wholesome water; but less than 15 degrees of temporary hardness, or five degrees of permanent hardness, are considered unobjectionable. In fact, some recent investigations seem to prove that a moderate amount of these impurities are actually desirable. Dr. Letheby, an eminent English chemist and sanitarian, made examination into the water supply of 65 English and Scotch cities and towns, in connection with the mortality, and was of the opinion, that the less the quantity of mineral ingredients in the water, the greater the death rate; and in another place writes: "The soft waters of the lakes of Scotland, for example, may have had something to do with the choice of brown meal, which contains so much saline matter; and but for the calcareous waters of Ireland the potato could not have become a national food."

The answers to circular No. 7 do not furnish any analysis of water obtained for ordinary use from wells and springs. The water supplied to Detroit has less than 10 grains of inorganic solids to the gallon, and it is presumed Bay City and Port Huron are supplied with water of about the same quality. Grand Rapids has no analysis of the present source; the analysis made by Dr. Kedzie some time since would place the supply as having an excess of temporary hardness. The analyses of the different mineral wells in the various parts of the State, show an excess of chloride of sodium, carbonate of magnesia, and sulphate of potash, soda or lime.

Sodium chloride (common salt), is easily recognizable, if greatly in excess, and at once such a source of water supply is rejected.* Many of the other minerals are not so easily recognized, but the ill effects are none the less sure to follow its use as a beverage. Some forms of indigestion, and in many instances constipation and visceral obstruction are induced by the use of such waters, whereas an excess of calcium and magnesian sulphate produces diarrhea. Goitre, however, is the disease which has most of all been attributed to the excess of mineral ingredients in water. In Nottingham, England, this disease prevails to some extent and by the common people is attributed to the hardness of the water. In other parts of England, particularly Derbyshire, Yorkshire, Hampshire, and Sussex, the disease prevails only where the magnesian limestone formation prevails. In Switzerland, India, and in some parts of New York, this disease and cretinism, an allied disease, have been traced over large areas, and it is not uncommon to find swellings of the neck rapidly supervene upon the use of such waters. The prisoners of Durham jail were at one time greatly afflicted in this way; an examination of the water showed that it contained 77 grains of lime and magnesian salts to the gallon. A change to a purer water soon relieved the afflicted.

Some natural waters also contain iron, and if in sufficient quantity to give a chalybeate taste to the water, not unfrequently induce in the drinker headache, indigestion and a general out-of-sorts feeling.

Other metallic impurities in water are usually the result of contamination by the washings or drainage from chemical works, mines, etc., or in the case of lead, by the action of the water on pipes or cisterns. A very small quantity of this metal in the water habitually used, even one-twentieth of a grain per gal-

*It is said the water which filters from some sewage farms in England is much liked, because pleasanter to the taste, in consequence of containing chloride of sodium in solution.

lon, may be attended with danger. The use of lead, unprotected from the action of the liquid in contact therewith, can not be too severely condemned in all cases where the water or other liquid is to be used as a food or drink.

ORGANIC IMPURITIES OF WATER.

The vegetable matters present in water may be either dissolved or simply held in suspension. Peaty water, often of a brownish tint, frequently contains but two grains of solid matter to the gallon, and in the absence of a more palatable water, cannot be considered objectionable; but water containing a large quantity of vegetable matter partly in solution and partly in suspension, has been known to cause diarrhea, and "since the days of Hippocrates downwards it has been popularly acknowledged to be productive of ague and other malarious ailments." Many communities have proven by their experience that the drainage and cultivation of a certain district and the use of a pure water, have rid them of much sickness of a malarious character.

In a sanitary point of view, the most pernicious of contaminations in water for domestic uses is that derived from animal decompositions. This, whether in the form of putrescent animal substances immediately in contact with the water, or derived from sewage by percolation from cesspools, privies or other filth accumulations, or by the discharge of sewage matter direct into streams, lakes, etc., converts the water at that point into a loathsome and dangerous poison.

To this form of contamination all settlements are more or less exposed whenever their water supply is derived from the immediate neighborhood. By referring to the answers of correspondents to circular No. 7, published in the Third Annual Report of the State Board of Health, it will be seen that a large majority either cite cases tending to prove that certain forms of sickness, notably dysentery and typhoid fever, were induced by such contamination in the water supply, or that they had known of such results following. Of late years this subject has attracted considerable attention, and deserves more, until every one shall be impressed with the necessity of being provided with a full supply of pure water for domestic purposes.

It seems superfluous, after what has been already published, to further cite cases confirmatory of this means of contagion. Mr. Simon, in his report to the Privy Council of Great Britain, has collected much evidence to prove the connection of the infection of cholera with the contamination of the drinking water by dejections from those already suffering, and whether one accepts or rejects the theory of contagion in cholera through the influence of the atmosphere, it cannot be denied "that whenever choleraic evacuations make their way into the drinking water we may expect to find the disease burst forth with the greatest virulence and fatality amongst those who use the water, and that indeed the endemic area will approximate with remarkable closeness to the limits of the district which it supplies."

We have ample evidence in our own State that typhoid fever is often conveyed from the sick to the healthy by means of the drinking water, and Sir Wm. Jenner says: "The spread of typhoid fever is, if possible, less disputable than the spread of cholera by the same means. Solitary cases, outbreaks confined to single houses, to small villages, and to parts of large towns—cases isolated, it seems, from all sources of fallacy—and epidemics affecting the inhabitants of large though limited localities, have all united to support by their testimony the truth of the opinion, that the admixture of a trace of fæcal

matter, but especially the bowel excreta of typhoid fever, with the water supplied for drinking purposes, is the most efficient cause of the spread of the disease, and that the diffusion of the disease in any given locality, is limited, or otherwise, and just in proportion as the dwellers of that locality derive their supply of drinking water from polluted sources." The Tenth Report of the Medical Officer of the Privy Council of Great Britain is replete with confirmatory evidence. Dysentery and diarrhea have also been frequently traced to a contaminated water supply. Any extended remarks upon such a familiar fact are entirely uncalled for. Other diseases have also been, and it is highly probable rightly, ascribed to the same influence, such as ulcerated sore throat, erysipelas, diphtheria, and low forms of fever, although the evidence is not conclusive.

The conclusions I would arrive at, from the answers received to Circular No. 7, are:

1. That the State of Michigan has ample supplies of good potable water, at almost all points, but that judicious care should be exercised in its selection.

2. That a better construction of spring basins and wells is imperatively demanded; all forms of wooden tubs, curbing, or other use of wood, in contact with the water, should be entirely avoided.

3. That in localities, where it is as yet impracticable to obtain a full supply of good moderately hard water, and therefore the rain water must be utilized, that the cisterns should be cleansed frequently, the eave-trough pipes should be provided with cut-offs, to prevent as much as possible dirt from roofs entering the cisterns; that the cisterns should be well ventilated, and the water filtered before using. That filters for this purpose should be composed of sand in which a little lime is incorporated, gravel and animal charcoal.

4. That in all cities and villages dependent on private wells for the water supply, a much greater care should be exercised in the location of the same, especially as concerns the nearness to cesspools, privies, and drains. And that for the safety of the inhabitants of such cities and villages, the introduction of the dry earth closet system is especially to be recommended.

5. In cities supplied by public water works, that the service in individual houses would be safer if glass or tin lined pipe was used, and that in the location of pipes care should be exercised to avoid contiguity to sewer or gas pipes and cesspools.

In the arrangement of this article I have purposely avoided the subject of chemical examination of water, as my colleague, Dr. Kedzie, I believe is engaged upon a paper having this subject especially in view.

A. H.

THE WATER-SUPPLY

IN ITS

RELATIONS TO HEALTH AND DISEASE,

IN SOME OF THE

TOWNSHIPS, CITIES, AND VILLAGES OF MICHIGAN;

BEING REPLIES OF

REGULAR CORRESPONDENTS

OF THE

STATE BOARD OF HEALTH,

TO

CIRCULAR NO. 7 OF THIS BOARD.

(Arranged for publication by the Secretary of the Board.)

THE WATER-SUPPLY OF LOCALITIES IN MICHIGAN.

In October, 1875, a circular was sent to the regular correspondents of the State Board of Health in this State, asking replies to thirty-six definite questions relative to the water-supply of the particular locality in which each correspondent resided. The circular is printed herewith, and made to precede the replies, in order to save repeating the several questions with the replies of each correspondent. The circular was so planned as to lead to good results in at least three ways: As indicated in the first paragraph of the circular, the replies were expected to collect information relative to the water-supply throughout the State, which would be useful to Dr. Hazlewood,—committee of this Board on "Food, Drinks, and Water-Supply,"—in his work for the Board in connection with this subject. The replies were expected to contribute valuable data toward the Sanitary Survey of this State being made by this Board, by supplying definite and concise statements of the conditions affecting the water-supply in the several parts of the State; they were also expected to furnish details of cases of sickness believed to be due to the use of impure water, and descriptions of the methods by which the water became impure.

The expected good results indicated above have been realized: In the last Report of this Board may be found an introduction, and in this Report, a paper, on the subject, by Dr. Arthur Hazlewood of this Board, in which reference is had to conditions stated to exist in different parts of Michigan. In the last Report of this Board, and in the group of replies here published, may be found some of the valuable data expected relative to the actual conditions affecting the water-supply in the several localities for which replies have been received, being results collected by the forty-four observers in the thirty-six different localities about the State. These replies contain many facts relative to sickness among persons using water from impure and suspected sources, and it is hoped that the publication of these facts will lead to greater care on the part of many persons, who would not otherwise have given the subject a thought, and that, as a result, many deaths and cases of sickness, which would have occurred, may be prevented. Those facts which relate to permanent conditions will also be of great value, and will need to be kept in mind and studied in connection with almost all researches made, in the immediate future, into causes of sickness in different parts of this State. In order to complete this very important item in the Sanitary Survey of this State, which is gradually being worked out, it remains to secure definite statements for those parts of the State not yet reported for, and more complete statements for some of the localities for which some statements have already been received.

The replies of correspondents are published in this, as in the last, Report in the order in which they were received and filed at the office of the Secretary.*

H. B. B., *Sec'y.*

[7.] CIRCULAR TO CORRESPONDENTS RELATIVE TO WATER-SUPPLY.

OFFICE OF THE STATE BOARD OF HEALTH,
LANSING, MICHIGAN, October, 1875.

To the Correspondents of the State Board of Health:

GENTLEMEN :—Dr. Arthur Hazlewood of Grand Rapids, a committee of this Board on "food, drinks, and water-supply," desires to collect information relative to the water-supply throughout this State. Will you have the kindness to send, as soon as convenient to the central office of this Board at Lansing, your responses to the following questions? In your reply it will not be necessary to repeat the questions, but simply to refer to them by number.

1. Are you located in a city, village, or in the country ?
2. From what source is the chief water-supply of your city, village, or locality?
3. What relation does the water-supply sustain to the drainage and to the sewerage of your own or of some neighboring city, village or locality?
4. If there is close relation with sewerage, of what does the sewage consist?
5. If the water is taken from a stream, what is the rapidity and direction of the current; is it constant in direction; if not, what affects it, and what are the usual conditions?
6. From what distance is the water brought?
7. In what kind of conduit?
8. To what extent is it accumulated in settling or other reservoirs?
9. Is any process for filtering or purifying used, besides reservoir settling?
10. what is the average amount of water flowing into receiving reservoirs each day?
11. What is the average amount of water consumed each day?
12. How many gallons daily to each inhabitant?
13. To what extent is water from artesian wells used?
14. To what extent is cistern water used?
15. Is it filtered before storing?
16. Is it filtered before use?
17. Of what material are the cisterns constructed?
18. To what extent is spring or well water used?
19. In that part of your city, or in localities where well water is used, what is the character of the soil?
20. What is the usual depth of the wells?
21. What strata of earth are passed through?
22. State, if you can, in what direction the strata dip?
23. State, if you can, the nature of the stratum which underlies and maintains the water in the wells?
24. What is the usual distance between the well and the nearest privy?
25. What is the usual distance between the well and the nearest cesspool?

* Although the first part of the communication from Dr. Ranney, in last Report, came before a few which come first in this Report, the final completion of it was a little deferred. The continuation of the communication will be found in its proper order of final receipt.

26. Please give details of any cases of marked exception within the distance named in answer to last two questions?
27. Are the water-works, cisterns, springs, or wells so located and constructed that there is no danger that the water therefrom may be subject to sewage, cess-pool, or other contamination?
28. Has the water supplied by water-works, cisterns, springs, or wells been offensive in taste or odor at any time? If so, at what time, and what was the cause?
29. Have any analyses of water in your locality been lately made? Please send results of all analyses.
30. Except where results of analyses are sent, please state your opinion of the quality of the water from the water-works, wells, cisterns, artesian wells, etc. Is it clear or turbid; does it probably contain organic matter in dangerous form or amount; is it hard or soft?
31. What have you observed as to the contamination of water by decomposition of wood, pipes, pumps, curbing, etc., at or near the surface?
32. What, as to lead or other metal derived from pipes or vessels with which the water has been in contact?
33. What have you observed as to the influence of rainfall, freshets, or drought upon the purity or healthfulness of the water-supply?
34. What relation between the water-supply of any of the inhabitants, and the grave-yards of your locality?
35. Please give details of any cases of sickness which have occurred which could be fairly attributed to drinking impure water, or to its use for other purposes?
36. Please give a statement of any apparent influence, due to quality of water used, upon cases of epidemic or other diseases originating from other causes?

After sending in your response, please preserve this circular, as a memorandum of some of the points connected with this subject upon which this Board desires to hear from you hereafter, whenever you have anything of interest on the subject to communicate.

By direction of the State Board of Health.

Very respectfully,

HENRY B. BAKER,
Secretary.

REPLIES BY J. H. BEECH, M. D., OF COLDWATER, MICH.

To the Secretary of the Michigan State Board of Health:

Response to Circular 7,—"Water Supply:"*

1. Coldwater City, Branch Co.
2. Wells at nearly each dwelling.
14. I know of only one family.
15. I think not.
16. Yes.
17. Stone or brick coated (plastered) with water lime.
18. Well water almost entirely.
19. Gravelly loam.
20. At east part of city plot 12 to 18 ft.; western part 25 to 28 ft.
21. *a.* Soil 15 to 20 inches, well supplied with humus. *b.* Reddish hard-pan, 1 to 2 feet, which softens very readily with water. *c.* Coarse gravel 6 to 18 feet, detritus of granitic slate, lime and magnesian rock. *d.* Water-worn rubble, size of turkey and geese eggs, coated or cemented together with a lime hydrate, interspersed with veins of fine gray or nearly white sand, 8 to 20 feet. In this rubble or sand pure water is found at nearly (probably exactly) uniform grade of descent from east to west. It cannot be dug through on account of abundance of water; but iron pipes driven strike clay after passing through this water-bearing gravel.

*The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

23. The aforesaid well tubes or pipes have been bored or driven from 15 to 30 feet without passing the clay. In places, pockets of brackish water, sometimes clear and sometimes of reddish color, have been struck, but nothing useful.

24. 30 to 50 feet.

25. 8 to 20 feet.

26. There are instances in which the great confidence which some citizens have in the filtering capacity of our splendid subsoil have enabled them to "stomach" well water from within twelve feet of a privy vault dug five or six feet deep, or even less than twenty feet from an old well used for privy vault and cesspool; and really we cannot trace as yet any decided contaminations injurious to health. Of course time must show the filtering capacity nullified by the ever-extending fouling of the filter. At some houses the "cess" *spot* is all about the well, especially if a "drive well," and they will sneer at efforts made to convince them of danger, or perhaps promise in an abstracted, vacant manner (which indicates want of intention) to correct the evil. I hope to get time to make some special surveys and further report on this subject.

29. No analysis of water in the city wells has ever been made that we know of. Prof. Kedzie a few months ago examined water from a well in clay at the State school buildings, but that is not like the supply on the plain below.

30. Our well water is beautifully clear, moderately hard, and after standing in the air for a short time will be covered very thinly with a whitish powder, probably some form of lime or magnesia. Earthen pitchers and glass ware become crusted by water standing in them.

34. There was, twenty-five years ago, a burial ground which had from thirty to fifty graves where is now a thinly populated part of the city. Ten or twenty bodies must have remained in the ground. A street runs through and characteristic depressions are seen occasionally. It is not an unhealthy locality, except after wet springs, when a pond in the vicinity encroaches.

35 and 36. As intimated at No. 26, I shall endeavor to investigate this subject, but at present can only answer in the negative as to *marked* results. I have delayed answering hoping for information from those in general practice or for time to thoroughly investigate, but now, remembering that "half a loaf is better than no bread, I resolve to wait no longer.

Very respectfully yours, etc.,

J. H. BEECH, M. D.

Coldwater, Branch Co., Mich., Nov. 8, 1875.

REPLIES BY W. T. CARPENTER, M. D., OF ISHPEMING, MICHIGAN.

Secretary of the State Board of Health:

DEAR SIR:—Please accept the following answers to circular relative to water-supply, dated office State Board of Health, October, 1875:*

1. Ishpeming has a city charter; population about 5,000. Town chiefly built on a peat swamp 17 miles from, and 700 feet above level of Lake Superior. Swamp surrounded by iron-bearing hills or knobs from 50 to 150 feet high.

2. Partly supplied from Lake Angeline by Holly pump, but chiefly from artesian wells in the swamp, and ordinary wells on the hillsides.

3 and 4. No relation.

5. No stream water used.

6. About half a mile from Lake Angeline.

7. Iron pipe.

8. No reservoirs except for fire protection.

9. No.

10, 11, 12. No estimate. The lake-water works belong to mining companies. No water meter is used. No rates paid.

13. About half the water used comes from artesian wells.

14, 15, 16, 17. No cisterns.

18. About two-thirds of the water used is spring or well water, including artesian wells.

19. On hill-sides wells pass through a coarse gravel. Artesian wells in swamp pass through peat averaging 10 feet in thickness, then into a fine white sand.

20. On hill-sides from 20 to 50 feet; in swamp, 15 to 20 feet.

21. See 19.

*The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

22. No dip, of course, in swamp. On hillsides, dip is very irregular. Geologically speaking, town lies on a "synclinal axis."
23. Clay, quartzite, diorite, talcose and chloritic schist.
24. 40 to 100 feet.
25. No cesspools.
26. There are a few artesian wells in swamp within 10 to 20 feet of privy.
27. No danger on hill-sides.

It is a question whether the water in the sand beneath the peat can be contaminated by sewage or other offensive matter in the water which overlies the peat. Experiments indicate that it is not. I have driven artesian pipe a foot from old privy wall, and found the water pumped up from the sand (17 feet) apparently pure. In building the town the swamp is first filled in with refuse rock from the mines to a depth of 3 to 5 feet. Privy vaults are made by clearing out this filling, and excavating only 2 or 3 feet into the peat. In my opinion there is no infiltration of surface water through the peat. If there is any local communication between the water below and that above the peat, it is by pressure from below upwards.

28. In the spring when the snow thaws, the well water has a slight brackish taste, produced, I suppose, by lime, iron, and other matter washed down from the rocks, which have lain through the winter of six or seven months, inert. No deleterious effect has been noticed from this.
29. No accurate analyses. All the well water contains lime and iron.
30. Water brought from Lake Angeline is soft, clear, and free from taste. The well water is hard, and has a slight chalybeate flavor. Neither contain organic matter to any great extent.
31. Nothing.
32. Nothing.
33. See 28.
34. No relation. Grave-yard is a half-mile from town, on a site the drainage of which is not connected with the swamp which underlies the town.
35. The surface of the swamp is drained by a creek which passes through the town. A large hotel, chiefly for summer visitors, has been built, with a sewerage connection with the creek. The creek also receives sewage from a mining location one-half mile above hotel. The hotel receives water supply from the Lake Angeline conduit. Last January the main conduit froze, cutting off the supply. The next morning the employès of the house, unknown to the proprietor, drew water from the creek which was used in the house for culinary purposes, etc. The next day nearly every boarder and employé of the house was taken sick, some lightly, others with alarming severity; chief symptoms were vomiting, diarrhea, and gastric "cramps." All recovered. No water from the creek was used after the second day. No such sickness had occurred in the house before, nor has it appeared since. I have no doubt of the cause of the epidemic. It was poison received from the creek-water. No other cases, answering this question, have come to my notice. The mining location, referred to above, is within the city limits. The creek forms no part of our water supply.
36. Nothing observed. I have looked for the influence upon diseases, of the constant use of water impregnated with iron, but at present have nothing to communicate upon that subject.

Very respectfully,
W. T. CARPENTER, M. D.

Ishpeming, Mich., Nov. 5, 1875.

REPLIES BY A. OVERFIELD, M. D., OF HOUGHTON, MICH.

Secretary State Board of Health, Lansing, Mich.:

DEAR SIR:—Touching the "water supply" of this place, I have gathered the following: *

1. In a town of about 2,500, situated upon the south side of Portage Lake, mostly on a hillside sloping towards the lake.
2. From springs and wells generally.
3. The wells in lower part of the town are sometimes contaminated with sewage.
4. Consists of slops from hotels, and general street refuse.
6. About 400 feet, only in a few instances, from springs.
7. Ordinary gas-pipe.
9 and 13. None.

*The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

14. Probably one-third.
15. 16. No.
17. Stone and cement, underground.
18. Largely.
19. Trap rock.
20. About 6 feet.
21. Alluvial soil, then trap rock.
22. Northwest.
24. Average about 50 feet.
27. No.
28. Yes, in the spring, from refuse washed in from the streets.
29. No.
30. Clear; hard, but not from presence of limestone.
31. Nothing.
33. Heavy rainfalls render water less pure in lower part of town.

I have no means of getting at answers to questions omitted. Perhaps in the future I may be able to furnish something more satisfactory.

Very truly,

A. OVERFIELD.

Houghton, Mich., Nov. 6, 1875.

REPLIES BY JOHN P. STODDARD, M. D. OF ALBION, MICH.

Secretary State Board of Health:

DEAR SIR:—In reply to circular No. 7 concerning water supply:*

1. In a village.
2. From wells entirely.
3. Our water-supply sustains no relation to the drainage or sewerage of any other village, and scarcely none to the drainage of our own; but to the sewerage of our village it does, in certain localities.
4. In certain localities the kitchen drains must more or less contaminate the wells, being too near thereto. The sewerage consists generally of short drains opening into a closed pit partly filled with stones. The other sewerage and drainage is by surface drains entirely.
5. Not taken from a stream.
6, 7, 8, 9 and 10. Not applicable.
11 and 12. No means of ascertaining.
13. None.
14. None.
15, 16 and 17. Not applicable.
18. Entirely from wells.
19. Mostly a gravely or sandy loam.
20. From twenty to forty feet. In the western part of the village some wells are only from fifteen to twenty-five feet; in the eastern part from twenty-five to forty-five feet.
21. Can't say.
22. Dips to the southeast.
23. Either clay and conglomerate of stone or rock.
24. All the way from twenty feet to twenty rods.
25. The village is very free from cess-pools except those arising from kitchen drains.
26. I know of no case that has yet caused any sickness.
27. Yes, except in few cases as mentioned above.
28. Three of four wells in town are troubled at times with a sulphuretted hydrogen odor and taste. Can't tell the cause, but must be from decaying wood or organic matter. One well, that is dug through a stratum of loose blue clay, has a permanent taste and odor of sulphuretted hydrogen.
29. None, except a spring at the western limits of the village. It is not at present used for water-supply.
30. Analysis of the Warner spring, at Albion, Michigan, made by the chemist at the Cornell University, New York:

* The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

Specific Gravity 1002.20

	Grains.		Grains.
Sulphate of Potassa	.320	Bicarbonate of Magnesia	4.703
Sulphate of Soda	2.120	Bicarbonate of Iron	1.700
Sulphate of Lime	3.390	Silica	.175
Chloride of Sodium	1.250	Aluminum	.250
Bicarbonate of Lime	16.973	Organic Matter and loss	1.020

Solid constituents per gallon 31.901 grains.
Bicarbonates 23.376 "
Sulphates 5.830 "

31. Yes, in a number of cases.
32. Nothing.
33. No.
34. None.
35 and 36. I have had no case of sickness that I could attribute to any such cause.

JOHN P. STODDARD, M. D.

Albion, Mich.

REPLIES BY H. W. BROWNE, M. D., OF HUBBARDSTON, MICH.

To the Secretary of the State Board of Health:

SIR:—Pursuant to your request contained in Circular No. 7, from office of State Board of Health, relative to water supply, I herewith transmit answers to such questions as are applicable to my locality, regretting my inability to meet more fully your wishes:*

1. Village of Hubbardston, Ionia county.
2. Wells furnish the chief water-supply for use of inhabitants; for cattle the supply is mostly drawn from a small stream,—Fish creek, so-called.
5. General direction south, a little west of south; current about one mile and a half, in the spring perhaps two miles, an hour. Pure and clear. More rapid current in the spring.
13. There are two Magnetic Mineral Springs, so-called, at this place; although it is now well known that the water has no magnetic properties. The water of these wells is used considerably for drinking, and medicinally, as it is a popular belief that these waters have curative properties.
14. Cistern water is in general use, but not for drinking, except in dry seasons.
15. No.
16. No.
17. An excavation is made in the clay of the form and dimensions required, then the surface is plastered with water lime. A few are constructed of brick.
18. Afford the chief supply.
19. Sand, with clay subsoil.
20. Generally less than twenty feet.
21. Modified drift and boulder drift.
22. There are no strata of rock reached in the wells. We are about one hundred and twenty-five feet above the bed rock.
23. The boulder clay.
24. Less than fifty feet. Average between thirty-five and forty-five feet.
25. There are no cesspools, as such. I do not know of any vault constructed for that purpose. The universal custom is to throw "slops," garbage, etc., out of the kitchen door, or window,—there are but few sinks,—which is within ten feet of the well. There is usually a slope from the door to the well. The wells are thus subject to sewage contamination. Of course there are exceptions to this. Some householders are careful to carry the filth away from the well.
26. Answer reserved for further investigation.
27. They are not, unless the "drive wells," so-called, are so constructed. This is done by driving iron tubing into the ground till water is reached. The water is not allowed to come in contact with the porous soil through which the bore is made, but is brought to the surface in pipes.
28. I have frequently observed that in shallow wells the water becomes offensive both in taste and odor during the latter part of summer. In those cases which I have observed, it has been where a great amount of sewage and cesspool material has been allowed to accumulate near the wells, has become absorbed into the soil, while it was

*The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

light and porous, and has reached a depth sufficient to contaminate the water-course, and the water, passing through this soil, dissolves great quantities of organic matter, which water flows into the well. This would seem to be the fact, for in the winter when the ground is frozen, the water is good. In one case dead toads were found in a well.

29. Analysis of the Russell Mineral Spring, Hubbardston, Ionia county, Mich., by Professor Kedzie, of the State Agricultural College, Lansing, Mich.

Carbonate of iron, grains	1.	Sulphate of lime, grains	6.61
Carbonate of magnesia, grains	8.90	Chloride of sodium, grains	9.16
Carbonate of lime, grains	15.71	Nitrate of ammonia, grains	2.
Carbonate of soda, grains	11.05	Silica, grains	3.
Carbonate of potassa, grains	3.50	Organic matter and loss, grains	1.07
Sulphide of iron	trace.	Bromate of iron	trace.

Total mineral matter in one gallon, grains, 62.
Temperature, 49 degrees.
Carbonic acid gas in one gallon, 12½ cubic inches.
Sulphuretted hydrogen, a trace.
No late analyses have been made.

30. I think as a general thing the water is pure and sweet; does not* contain organic matter to any appreciable amount; is hard for the most part; contains sulphate of lime, and carbonate of lime. This is quite a lime district.

31. I have no special facts to bring to bear upon this point, but I have frequently observed the pump, and curbing, old and decayed at the surface, when the water is said to smell and taste bad. Pumps of wood are the rule in this vicinity, but there are some wells with the old fashioned bucket and windlass. Some wells are walled up with plank; many have been made with barrels, with heads knocked out, placed one above the other, and a pump set inside. But every one who can, is making a good well, stoned up, with a substantial pump.

32. I am not aware of any lead or copper pipe being used in the wells. Iron is used extensively. I don't know how it may be in the large towns, but in this wooden country the high price of the two former metals would prevent their use.

33. I have observed that after freshets, and, sometimes, a few days after a heavy shower, the water in certain wells would be fresher and pleasanter. I have noticed no particular influence of drought.

35. I have no notes of any particular cases bearing upon this point. But I have no doubt that at least one-fourth of the malarial and other diseases afflicting the first settlers in the "new" lands, may be fairly attributed to the wretched water used for drinking and other purposes. This is spring water, so called. It is turbid, brackish, and warm, and around the spring there is usually a large space of ground covered with stagnant water.

36. I have observed in cases of dysentery—I have never seen the disease when epidemic in Michigan—a marked amendment to occur in the character and frequency of the discharges, and the temperature of the body at the same time lowered, when rain water had been substituted for (and exhibited freely to patients) well water which contained much lime. I have observed the same thing in the diarhœa of typhoid fever.

H. W. BROWNE, M. D.

Hubbardston, Mich., Nov. 7, 1875.

REPLIES BY HENRY F. THOMAS, M. D., OF ALLEGAN, MICH.

Secretary State Board of Health, Lansing, Mich.:

DEAR SIR:—In reply to circular No. 7, I would say that:†

1. Allegan is a village.
2. Water-works, wells and springs.
3. No relation.
4. None.
5. No.
6. From a well twenty rods from the pumps.
7. Iron.
8. None.
9. No.
10. No reservoirs are used.
11. I have no means of knowing.

*In this vicinity.

†The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

12. 13. None.
14. Five per cent.
15. No.
16. No.
17. Water lime.
18. Twenty-five per cent.
19. Sand.
20. Thirty to sixty-five feet.
21. Sand, clay and gravel.
22. Cannot.
23. Clay.
24. Forty feet.
25. Our drains all lead to the river.
26. None.
27. I think the water-works are. I cannot say as to all the wells; most of them are.
28. No.
29. No.
30. The water from the water-works I think is good; it is clear, soft, and does not contain organic matter in dangerous amount.
31. That it does *contaminate* the water.
32. That iron is the best.
33. Occasional rain-falls improve it.
34. None.
35. I have none.
36. I have not kept a history of any case, yet I know it has an influence upon diseases, and I will keep a record of such cases in future, and report.

Respectfully,
HENRY F. THOMAS.

Allegan, Mich., Nov. 16, 1875.

REPLIES BY J. ANDREWS, M. D., OF PAW PAW, MICH.

Secretary of State Board of Health:

DEAR SIR,—Your circular, soliciting information in reference to our water supply, was received some time since, and ought to have been answered before now; but pressure of business has prevented. I will answer your queries as well as I am able by referring to their numbers :*

1. We are located in a village of about two thousand inhabitants.
2. The town is supplied with water entirely from wells.
3. There is no system of drainage other than the natural drainage afforded by the river, which is twenty-five or thirty feet lower than the level of the town, the land descending gradually towards the river.
13. There are no artesian wells in town.
14. No cistern water is used for culinary purposes; but,
18. Well water is exclusively used for such purposes.
19. The soil is sandy, resting on a bed of firm, pure blue clay, which varies from two to sixty feet in thickness.
20. Depth of wells from ten to seventy-five feet, the shallow ones not going through the blue clay.
21. Sand, blue clay, and into coarse gravel.
22. West, towards the river. I should say, however, that the blue clay seems to be wavy, approaching the surface in some places to within five or six feet, while in others it is twenty-five or thirty feet below the surface.
23. Wells passing through the blue clay uniformly terminate in coarse gravel.
24. Distance varies all the way from about twenty-five to one hundred feet.
27. I think the wells generally are not likely to be contaminated from the sources mentioned.
28. The water in cisterns frequently becomes offensive in consequence of impurities from the roofs from which the water is collected; and the water in wells having wooden curbing sometimes has a bad odor and taste, but does not seem to be particularly unhealthy.
29. No analysis of our water that I am aware of, except that of a mineral spring in the village.

* The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

30. We think our wells furnish an excellent quality of water. It is rather hard.
31. Wooden curbing contaminates water to a certain extent, at least so far as taste is concerned, if it is not injurious to health, of which I am not thoroughly convinced.
32. No leaden pipes in use, but there are many drive wells, using iron pipes which give to the water a ferruginous taste.
33. Rain-falls do not seem to affect the water unfavorably.
34. A few of our people live within five or six rods of a grave-yard. They are as healthy as any of our citizens. Earth is a good purifier.
35. I cannot attribute any sickness to impurity of the water used.
36. I have not noticed that any diseases have been influenced by the water used.

J. ANDREWS.

Paw Paw, Nov. 18, 1875.

REPLIES BY EDWARD BATWELL, M. D., OF YPSILANTI, MICH.*

1. City.
2. Wells.
3. The situation of this city, located on both sides of the Huron River, with a declination on all points towards the "valley of the Huron," renders the subject of sewerage one to which very little attention has been given, the natural formation of the soil rendering "surface drainage" perfectly adequate to the demands. A brief outline of the soil through which our wells are sunk, will serve to illustrate and explain the little necessitv that seems to exist for a more systematic process of drainage. The soil is a sandy loam, then a thick stratum of coarse gravel is met with, varying in thickness at different points, according to distance from the river. Next is found a stratum of very hard blue clay, and then again a coarse gravel in which abundance of pure, clear, living water is almost invariably found.
20. Our wells are on an average about thirty feet deep, though a few in the more elevated portions of the east side of the city have to be carried to a greater depth, some even to sixty feet.
23. The stratum on which the water seems to lie is of the same hard blue clay as described above.
24, 25. As a general thing the privies are about four to six rods from the wells, and the cesspools are about three, and most generally consist of a hogshead or box filled with loose stones or coarse gravel and closely covered over: into this all the dish water and suds are conducted, and pass through to the loose gravel in which the hogshead is embedded, and having no bottom it meets with no obstruction, but continues for years to fulfill all the requirements.
26. In answer to this query, I would beg to cite as illustration one place in this city, where ten families are supplied from *one well*, which is forty feet deep. On the north are three cesspools into which all the liquid garbage from four stores with dwellings overhead flows continually. On the south and west are some *eight* privies, with vaults about six feet deep. The cesspools are about fifteen feet from the well, and the privy vaults not over twenty. Here, then, seem grouped together all the requisites for a violent outburst of a deathly epidemic. My duties as health officer of this city makes it incumbent on me to carefully watch over such localities, and though existing for years in the same condition, I have not been able to trace one single case of disease, which had its origin from the above exciting cause. The only solution I can offer is that all the filth permeates through the loose gravel until it meets the hard clay stratum, which here dips *towards the west*, and flows *away* from the well leaving its waters pure and uncontaminated. If the above state of things existed on the east side of this well a far different condition would doubtlessly exist.
30. The water of this city is better and its supply more ample than any place I know of, which depends on the same source for its requirements, and though I never heard of any analysis being made, doubtless it would prove its fitness for daily consumption. It is hard and unfit for washing.
36. The use of the water in some cases that came under my notice, where the formation of calculi of the bladder existed, seemed at first to exercise a prejudicial effect. Almost every house is provided with rain water cisterns, and some few use filtered rain water for drinking purposes. Rain-falls have little effect on the wells.

The above seem to be the only points I can afford any information on, and are the result of actual observation.

EDWARD BATWELL, M. D.

Ypsilanti, Mich.

*The figures beginning paragraphs refer to questions in Circular [7] printed on pages 84-5 of this Report.

REPLIES BY W. H. DIXON, OF HOUGHTON, MICHIGAN.

Secretary of the State Board of Health:

DEAR SIR:—Answers to questions propounded in Circular No. 7.*

1. Village.
2. Springs and surface water.
3. No relation.
4. No. Sewerage consists of launders emptying into the lake.
5. ———
6. From 10 to 500 feet.
7. Iron pipes.
8. None.
9. No filtering or purifying done.
10. Reservoirs not used to any extent.
11. Cannot tell.
12. Cannot tell.
13. Not used.
14. Not used.
15. No.
16. No.
17. Cisterns not used.
18. Used by nearly every family.
19. Heavy black soil, sandy, very rocky.
20. From 5 to 15 feet.
21. Heavy black soil, sand and gravel,—trap rock.
22. Towards the northwest.
23. Mostly trap rock.
24. Generally people have a house, barn, privy, and well on a lot 50 by 100 feet.
25. The village is on a hill-side, all drainings run to the lake.
26. No exceptions.
27. In the spring the snow is about four feet above the well; the first thaw, the surface water runs into the wells.
28. Yes. Spring thaw.
29. No analysis has been made.
30. All wells contain organic matter, but not in dangerous quantities,—hard and soft.
31. Nothing.
32. Nothing.
33. Any increased water-supply by rain makes the water roily, but does not have any influence otherwise.
34. No relation whatever.
35. No cases of sickness can be attributed to it, except in the spring the surface water causes diarrhea.
36. None.

No analysis of water has been made here. I can send you a sample of the water if you wish. There is only one chemist here who has the materials necessary to make a thorough analysis of water.

Respectfully yours,

W. H. DIXON.

Houghton, November 18, 1875.

REPLIES BY WM. BROWNELL, M. D., OF UTICA, MICH.

Secretary State Board of Health:

DEAR SIR:—Your circular to correspondents, relative to water supply, came duly to hand. I make reply to such of the questions contained therein as the location and existing condition of things afford information upon: *

1. In a village of about 1,200 inhabitants.
2. Wells and cisterns.
3. No way connected.
13. No artesian wells.
14. Used for washing purposes only.
15. No.
16. No.

*The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

17. Mostly brick.
18. Well water in general use for cooking and drinking purposes.
19. Gravelly.
20. 16 feet.
21. Gravel and sand.
22. Southeast by east.
23. Clay.
24. Fifty feet.
25. No cesspools.
26. Am not aware of marked exceptions.
27. As a general thing, I think they are.
28. Never, that I am aware of.
29. There has not.
30. Well water clear; does not contain organic matter in dangerous form or amount; is hard.
31, 32. Have had no observation worth relating in regard to the effects of decomposing wood, or of lead or other metals upon water with which they were in contact.
33. No marked influence upon our wells here, as to purity or healthfulness of water.
34. Grave-yard ¾ of a mile from village, and sufficiently distant from any inhabitant to prevent contamination of water supply.
35. I have recently been attending a German family out of town some distance, five members of which were taken sick within the period of a week, with a continued form of fever, in three cases with marked typhoid symptoms, and in one of these, complicated with inflammation of the brain, the patient died the 10th day; the others slowly recovered in from three to four weeks. In examining the premises to ascertain, if possible, the cause of such sudden and unusual amount of sickness, I found the well in the cellar, curbed up with old barrels, the water turbid, with more or less organic matter in it, but with no perceptible bad smell. The cellar had recently been filled up with all kinds of vegetables, coming close up and around the well, and the building, which had been open underneath through the summer, so banked up as to cut off all ventilation of the cellar. I thought it more than probable that impure water and imperfect ventilation had much to do with their sickness, and my first work was to provide against the continued influence of these two evils.
36. I have made no careful observation in reference to such influence.

Respectfully yours,
WM. BROWNELL.

Utica, November 26, 1875.

REPLIES BY CHARLES RUSSELL, M. D., OF HASTINGS, MICH.

Secretary State Board of Health:

DEAR SIR:—Enclosed please find answers to such questions of Circular No. 7 as our city can furnish data for:*

1. City incorporated; population 2,500.
2. Wells.
3. Have no system of sewerage.
14. Not any to my knowledge.
18. Well water wholly.
19. Sandy loam mostly; some places clay.
20. About 26 feet.
21. Sand after first few feet, then gravel.
22. Can't say.
23. Usually gravel, sometimes quicksand.
24. Average distance about 100 feet.
28. No, except two wells a few rods apart, not used on account of supposed iron contained in water rendering it disagreeable.
29. No.
30. Clear; hard; think it does not contain organic matter in dangerous quantity.
31. Nothing.
33. Nothing.
34. Graveyard one mile from town.

Yours, etc.,
C. RUSSELL.

Hastings, Nov. 30, 1875.

*The figures beginning each paragraph refer to questions in Circular [7], printed on pages 84-5 of this Report.

REPLIES BY GEO. E. RANNEY, M. D., OF LANSING, MICH.

[NOTE.—The replies by Dr. Ranney to about all questions except No. 35, and accounts of some cases in response to that question, were published in last Report. This is a continuation of the subject.—H. B. B., *Secretary.*]

April 25, 1875, I was called in consultation with Dr. Park, of Okemos, to see a girl' aged about 14 years, living near that place, who was suffering with a continued fever Marked brain symptoms and confused intellect, great exhaustion, which had been increased by profuse nosebleed, were prominent features in her case. Analysis of the urine showed it contained albumen, but no tube casts. But it is a well known fact that albuminous urine is not a certain indication of Bright's disease, and in her case I regarded it as a concurrent or transient symptom of typhoid fever, especially as she passed a normal amount of urine, and as it contained no renal tube casts or other evidences of albuminuria, except delirium, which often occurs in typhoid fever. Other members of the family were unwell and were threatened with a fever, which they had vainly endeavored to break up with quinine, and instead of growing better were growing worse, and were but just able to be up and walk around.

The family used water from a spring situated in a ravine. A long continued drought had rendered the water shallow, and obstructed the drainage below the spring, while above it the mucky ground was wet and partially covered with water, but no free surface drainage existed. Six or eight rods above and to one side of the spring were located a barn, and barn-yard covered with manure, the washings from which I conceived, from the lay of the land, the dip of the geological strata, and character of the soil, could easily find their way into the spring. And here I cannot refrain from speaking of the frequency of typhoid fever in isolated farm houses while the disease does not prevail in other portions of the neighborhood. I think it often grows out of the fact that the farmer sinks his well with reference to its greatest convenience, perhaps to the barn as well as the house, without regard to the location of the privy, barn-yard, the lay of the ground, dip of the geological strata, or character of the soil, except that if it be sand or gravel the water percolating through it he thinks must necessarily be cleansed of all impurities that would be detrimental to health. This is a popular but fatal error which should be corrected in the minds of the people, for through these porous strata, impurities most easily find their way. But to return to the consideration of the properties of the water of this spring: I advised the family, before leaving the house, to stop using it for domestic purposes unless they first boiled it, which process would nearly if not quite destroy, for the time being, its poisonous properties. I procured a specimen of the water, fresh from the spring, and on my way home left it with Dr. Kedzie, and he had the goodness to make an analysis, the result of which showed the water to be poisonous, as it contained ammonia, nitrites, and positive evidences of decaying organic mattter.

In the case of this girl the disease ran a rapid course, and proved fatal. The other members of the family commenced improving as soon as they discontinued the use of the water.

September 26th, 1875, I was consulted by a young man suffering from the usual premonitory symptoms of blood poisoning from drinking impure water, and I informed him that he was threatened with a continued fever. The fourth day from the first consultation he sent for me, he having become quite ill and confined to his bed. This was a well-marked case of typhoid fever, and he became convalescent at the end of the fourth week, and has recovered, excepting from some lameness and swelling of one of his legs, which is a sequel of his fever.

Just previous to his attack he had been working for a man whose two sons had been and were suffering from the same kind of fever. The father himself became ill with a diarrhea, and was incapacitated for labor thereby two or three weeks. Procuring a specimen of the well water from this man's premises, and applying chemical tests, I found in it marked evidences of putrescent organic matter. This well was situated about two rods from a barnyard covered with large quantities of rotten manure.

December 8, 1875, I was called to a boarding house containing forty people, in this city, to see a patient ill with a continued fever. I at once suspected that he was a victim of blood poisoning from drinking impure water, and before leaving the house requested to go with the proprietor and examine his wells, of which he had two, one of which was in the cellar of the house, and was full, or nearly full of water; the other was in an alley in rear of this house, which is in a row of buildings, and another house abutted from the other way. A large underground loose drain ran within six feet of this well, which was not more than twelve feet deep, and sunk

through loose sand and gravel. Privies were too near for safety. The present proprietor of the house had been in possession but a short time, and had not been apprised in any way of the impurity of the water, though the former landlord had regarded it with suspicion, and used water from another well situated fifteen or twenty rods from this point. Many of the present occupants boarded with both proprietors, and had been usually well until they commenced the use of water from these wells. Two days previous to my visit spoken of above, I was consulted by a person suffering from nausea, irritation of the bowels, and diarrhœa, when I told him I feared it was on account of drinking impure water, but thought nothing more of it until my visit there, when I found that at least six of the family and boarders were quite indisposed from some unknown cause. The indisposition soon abated after they ceased using the water. The proprietor was very prompt to accede to my request to have the water analyzed, and accordingly sent specimens from each well to Dr. Kedzie. The results of the analyses are explained in the following

LETTER FROM DR. KEDZIE.

LANSING, December 11, 1875.

Dr. Geo. E. Ranney:

DEAR DOCTOR:—I have examined the waters sent me from wells in ——— block. The water from the well in the cellar *is unfit for domestic use*, because it contains a relatively large amount of nitrites, becoming exceedingly blue with Price's test; it contains a considerable amount of putrescible organic matter, and traces of ammonia; as bad well water as I ever examined.

The water in the other well contains putrescible organic matter, and sensible quantities of ammonia, but no nitrites. This water is of suspicious quality, but is much better than that from the cellar. I would advise that the water from both these wells should not be used for domestic purposes.

Very respectfully,

R. C. KEDZIE,
Member of State Board of Health.

I could report many other cases of disease resulting from drinking impure water, but refrain, for I fear my paper has already grown too long. Some interesting cases have occurred in my practice with those who contracted the disease by drinking unwholesome water at other places, but I am constrained to think there would be danger of exciting in such localities hostility of feelings towards any such report I might make, hence leave it to the profession of such localities who have an undoubted right to speak.

In assuming the duties in this inviting but much neglected, and, to some, a new field of investigation, the physician may run a risk of wounding the pride of some of his own neighbors by telling one that his cellar needs draining, that his privy or barnyard needs cleaning, or that his well needs correcting. Their premises may be disgracefully filthy, and therefore unhealthy, but to tell them of it awakens in them a feeling not complimentary to the doctor's politeness. Perhaps they point with pride to the clear sparkling water of their well and assert its purity, because they cannot see in it the lurking germs of death that may destroy them and those they love, and they may quote the couplet of John Trumbull:

"But optics sharp it needs, I ween,
To see what is not to be seen."

The *clearness* and *apparent purity* of the water may be owing to the carbonic acid that is generated in it by the decomposition of organic matter, and is only a subtle index to a deadly poison. For when the proper reagents are applied to this apparently "pure water" it is no longer sparkling; in it morbid elements have a habitation and a name, and in it the physician or chemist recognizes the germs of sickness and death.

Ignorance is the school of bigotry in medical as well as other subjects, and it behooves the profession to educate the people at the risk of disturbing their personal pride. A persistent and earnest effort in this direction will greatly diminish the diseases arising from preventable causes. By the scientific presentation of these facts in which their weal or woe is at stake we will ultimately secure their respect. The contrast of such motives as well as abilities with the dishonesty and ignorance of quackery, will tend to suppress it, and to elevate scientific medicine.

GEO. E. RANNEY.

REPLIES BY W. H. ROUSE, M. D., OF DETROIT, MICH.

Secretary State Board of Health:

DEAR DOCTOR:—I regret that I have not forwarded the subjoined report sooner. It arose from inability to obtain such information as was required. I can delay no longer. You will therefore please accept the incomplete statement, for the present at least.*

1. City of Detroit.

2. The Detroit river.

3. The receiving basin as now located is below the outlet of several sewers. The Orleans street sewer discharges its contents into the river about one hundred feet above the pumps. The fall is sufficient to give quite a strong current to the sewage. There are various kinds of factories along the bank of the river. All of these must contaminate the water near the shore, and it is quite possible that a strong current in the sewers from a heavy fall of rain or from rapidly melting snow, with a strong westerly or northwesterly wind, driving the current of the river up and from the American bank, might carry this filth to, or even beyond the receiving basin, and thus render the water supplied to the city filthy and highly injurious. That this suggestion is not without foundation, I would state that at the present time the water delivered at my residence, which is about two miles from the receiving basin, is quite turbid and deposits considerable sediment. There has been a strong wind from the northwest for about eighteen hours. There were moderate showers of rain yesterday, but none today. The danger of contamination from sewage will soon be obviated, as new works are being constructed about three miles further up the river. Not far from these new works there is considerable swampy land, but I am not very familiar with the locality, and prefer reserving my opinion till further information be obtained. The towns and villages on the river's bank above this city are so remote or small as to cause but little apprehension.

4. See No. 3.

5. The Detroit river flows past this city in a westerly direction with a velocity of about two miles per hour. The current is quite constant except as modified by the wind.

6. About 500 feet.

7. Iron. There are 193 miles of distributing pipes, of which 105 miles are wood and 88 miles iron.

8. The reservoir has a capacity of about 9,500,000 gallons, but as the water is forced at once into the distributing pipes, it is practically useless as a purifier or as a settling basin.

9. The water is distributed as drawn from the river, no attempt being made to filter, purify, or settle.

10. Not definite. See No. 8 above.

11. About 11,500,000 gallons.

12. 11,500,000 ÷ 100,000 = 115 gallons. The population of Detroit is probably more than 100,000.

13. None. There is no such well here.

14, 15, 16, and 17. Cisterns are so few in number that answers do not seem to be required.

18. Spring and well water are only used where the distributing pipes have not been extended.

19. The land on which this city is built is comparatively level. The soil is a tenacious clay. In 1829 an attempt was made to supply the city with water from a well. A four-inch shaft was sunk to the depth of 260 feet without finding water, passing in its course as reported, the following:

	Feet.
Alluvial earth	10
Tenacious marly clay with veins of quick-sand	115
Beach sand and pebbles	2
Geodiferous lime rock	60
Lias, including a cavity of 2¼ inches	65
Carbonate of lime impregnated with salt, again followed by the lias	8
Total	260

* The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

20. They vary very much in depth. There is one on my place about 30 feet deep. Some in the country are much less, while others are much more. From the nature of the soil in and about the city, the wells, to a very great extent, must be principally supplied with surface water. Some of these wells are located very close to the house and not unfrequently between the house and barn.

21, 22, 23, 24, 25. I am not very familiar with the surrounding country, to which these questions especially apply. See No. 20.

26. I observed one well about six feet from a barn, in which one or more cows were kept. It was full to the surface of the ground, and the family was sick.

27. No. The river water is very liable to sewage and other contamination from the relative location of receiving basin, sewers, factories, etc., and the well water from surface drainage, the soil being of such a nature as to render the passage of water through it extremely difficult.

28. The river water supplied through logs is often very offensive to both taste and smell, especially in hot weather, and in parts of the city where there are but few families. This is probably caused by the water flowing slowly and by the sulphur compounds contained in the water acting upon the organic matter of the logs. It would be well if iron pipes could be used exclusively.

29. I am not aware of any recent analysis of the river water. It was examined a number of years ago by Prof. Douglass of the University, and I subjoin his report. There were three specimens as follows:

No. 1. From an iron pipe at the residence of A. C. McGraw, on Jefferson avenue, between Rivard and Russell streets, collected January 25th, 1854.

2. From the wooden logs at the residence of Dennis Cuyle, corner of Orchard and Fifth streets, Crawford Park, collected October 5th, 1853.

3. From a well at the residence of Amos T. Hall on Woodward avenue, Park lot 11, collected October 5th, 1853.

Prof. Douglass' report is dated February 11th, 1854, and it states that he received on the 10th of November last, three stoneware jugs containing the specimens of water referred to,—hence the date of the No. 1 must be erroneous. It was probably in October, '53 instead of January, '54.

The following table will exhibit the quantity of each substance in 1,000 grammes of water:

	No. 1, Iron.	No. 2, Wood.	No. 3, Well.
Silica (flint)	.00500	.00583	.02370
Oxide of iron	.00500	.01330	.00625
Lime	.03528	.03192	.33590
Magnesium	Present.	.00045	.08910
Potassium	.00127	.00127	.10460
Sodium	.00245	.00245	.28740
Chlorine	Trace.	Trace.	.74890
Sulphuric Acid	.00550	.00680	.21420
Phosphoric Acid	.01430	.02385	Not determined.
Carbonic Acid	.01766	.01060	.17635
Alumina	.01050	.01050	Not determined.
Hydrosulphuric Acid		Trace.	Trace.
Oxygen, with K. or Na	.00111	.00142	.00960
Total	.09807	.10839	1.99600

"In determining the manner in which the above substances are combined among themselves to form neutral compounds, the precipitates formed, on boiling were first considered as carbonates; and then recourse is had to the law that governs the distribution of acids and bases, *i. e.*, the strongest acids unite with the strongest bases."

The following table will give the result of the calculation for 1,000 grammes, as before:

*The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

	No. 1, Iron.	No. 2, Wood.	No. 3, Well.
Chloride of Potassium	--------	--------	.11000
Chloride of Sodium	--------	--------	.72520
Chloride of Magnesium	--------	--------	.34760
Sulphate of Potassa	.00283	.00283	.10450
Sulphate of Soda	.00750	.00750	---------
Sulphate of Lime	--------	.00254	.28260
Phosphate of Lime	.03110	.05192	---------
Allumina	.01050	.01050	---------
Magnesia	--------	.00073	---------
Silica (Quartz)	.00500	.00583	.02370
Carbonate of Lime	.03300	.00510	.39190
Carbonate of Iron	.00814	.02160	.01020
Total	.09807	.10865	1.99570

The large quantity of the chlorides of sodium, potassium and magnesium found in the well water clearly indicates its surface origin. Such water would probably contain considerable organic matter and be a fruitful source of diseases, such as enteric (typhoid) fever, dysentery, diarrhea, etc. It is a common remark among physicians here that typhoid fever among parties who use river water and have not been out of the city is quite rare.

"The chemical analysis of the river water leads [Prof. Douglass] to the following useful conclusions:"

a. "The carbonates are found in very small quantities. As very little precipitate is formed on boiling, the water cannot be improved as to its 'hardness' by the application of heat."

b. "The sulphates and phosphates are the most abundant salts held in solution. The presence of the former, for reasons already stated, would forbid the use of wood conducting logs. That hydro sulphuric acid is formed by the spontaneous decomposition of the sulphates is shown by the presence of this noxious compound in the water taken from the logs." It would be very easy to furnish the professor with specimens during our hot seasons that would require very little chemical skill for him to determine the presence of sulphydric acid. Its odor might be known from afar.

c. "The analysis of number one, from the iron pipe, shows it to be water superior to that of most other cities." The solid ingredients are materially increased by the presence of silica, alumina, and iron, substances that can cause little or no injury to health.

30. See above.

31. See 28 and 29.

32. Lead is not usually found in the water. I have failed to detect it after repeated trials. It probably might be found in water passing through new pipes.

33. After having rains or high winds from certain directions (see No. 3.) the water becomes quite muddy, and deposits considerable sediment on standing.

34. ———.

35. A family of parents and two children used water from a well which was full of water and near the cow barn. The father was from home much of the time and was not sick. The mother and two children had remittent fever of a typhoid grade. Remedies seemed of no avail till the use of this well water was discontinued, when they gradually recovered.

Two families which received water from near the end of a wooden pipe suffered much last summer from a low form of fever. The water from the penstalk was quite offensive, and possibly was the cause of the trouble.

36. I have not had opportunity sufficient to enable me to speak authoritatively on this subject. I have been making notes in regard to "summer complaint" among children, but the data will not yet warrant definite statements, still I believe there may be some connection between the water-supply and bowel diseases in children.

While there are cases of sickness occurring which might be traced to drinking

* The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

water, I believe the citizens of Detroit may feel thankful the supply is so wholesome.

I may in time be able to obtain further information in regard to the "drinking water" in the country, for from this source I presume injurious influences on endemic and epidemic diseases will be most perceptible.

Trusting the above report may be of some use, I remain

Yours truly,

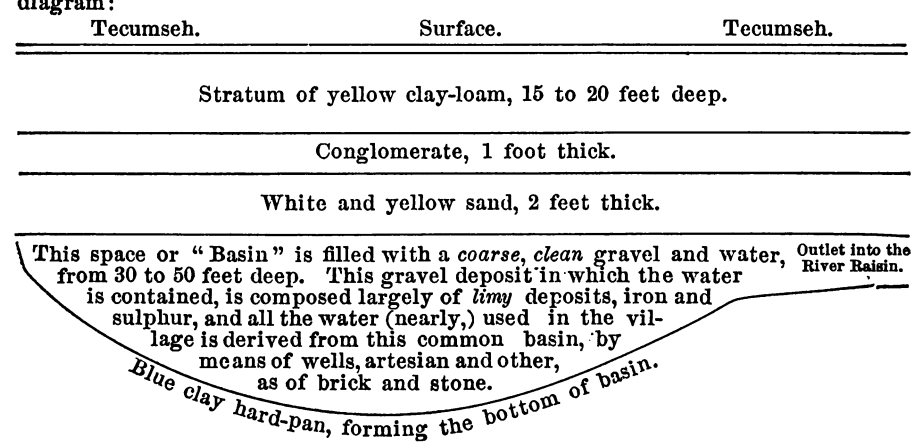
W. H. ROUSE, M. D.

441 South St., Detroit, Jan. 10, 1876.

REPLIES BY C. M. WOODWARD, M. D., OF TECUMSEH, MICH.

Secretary State Board of Health:

In answering the questions in Circular 7, I cannot do better, I think, than to give you a general idea of the situation of Tecumseh *geologically* with relation to the water supply, &c., presenting a rough diagram or sketch. Tecumseh is situated upon a level plateau rising up from the River Raisin, extending one mile east and west by one mile and a half north and south. Tecumseh is perhaps peculiar and different from most other towns in the State in regard to the water supply. It is situated as it were, on the *cover of a basin*, which has underlying it the following strata, as per diagram:



On the right of this diagram the basin forms an outlet into the River Raisin. Where the water flows out of the basin a heavy deposit of the conglomerate is formed, from the basin before described, which is one *grand filter*, is the source of 19-20ths of all the water-supply, which is obtained almost wholly by means of wells, artesian or otherwise, penetrating to the coarse, clean, gravel, and are all of them from 20 to 25 feet deep. These wells can never be exhausted. If the suction hose of one of Silsby's steam fire engines was placed in a given well and set to work, and pumped steadily for five days, there would be just as much water in the well when they stopped as before beginning. I think the diagram is *comprehensive* if *not* elegant. I will now proceed to answer the questions by number as near as I can:*

1. Village.
2. Wells.
3. Apparently none. There are no sewers in the town. The surface water filters through the strata until it reaches the hard-pan of conglomerate, which is entirely above and protects the source of the water-supply, and is drained off to the river, and finally empties in Lake Erie.
4. ———.
5. ———.
6. Usually about 20 feet.
7. Wells.
8. See diagram.
9. No.

*The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

10. Entirely incomprehensive.
11. 25,000 gallons.
12. About 10 gallons. This and the above estimate is made to include laundry and all other purposes.
13. About 1-20th.
14. About 1-20th.
15. Yes, when used at all.
16. When used at all.
17. Mostly of wood,—a few of brick and cement.
18. Well water 18-20ths.
19. See diagram.
20. 20 to 25 feet.
21. See diagram.
22. From west to east, towards the river.
23. See diagram.
24. About 40 feet.
25. We have no cesspools.
26, 27. I consider them to be so placed.
28. Occasionally an isolated well collects organic matter from the surface in sufficient quantity to give it a bad taste and odor. The well is then cleaned by scooping out some of the surface gravel on which the matters collect until nothing but *clean gravel* is taken up. The water is then treated with a good dose of common salt (chloride of sodium), and in a few days the water is perfectly pure, and remains so until there is a further collection of organic matter.
29. Not to my knowledge.
30. The quality of the water is good, and in nearly all instances *clear* and sweet, but of course is *hard*, coming as it does from a lime bed, *i. e.* a bed of *limestone gravel.* As a rule, the water in the wells is pure, and, except in a few instances, free from decomposing organic matters.
31. Nothing.
32. Nothing.
33. This seems to have no effect whatever upon the healthfulness of the water-supply, or its purity, and the taste is always the same.
34. None. The cemetery is entirely separated from the town by "Evans creek," a rapid flowing and pure stream of water; the cemetery being situated on a rise of ground or plateau, so that whatever impurities might filter through the soil is entirely carried off by the creek.
35. No case.
36. Have seen no case that could be clearly attributed to this influence in any manner. When I do, I will report.

Very respectfully, etc.,
C. M. WOODWARD.

Tecumseh, Lenawee County, Feb. 16, 1876.

REPLIES BY G. E. CORBIN, M. D., OF ST. JOHNS, MICH.

To State Board of Health:

Reply to Circular 7, in relation to water supply.*

1. Village—2,000 inhabitants,—lots cheap, and nearly every owner of a house here possesses *several*, which locates houses, wells, and privies at healthful distances generally.
2. Entirely from wells.
11. Have no knowledge.
13. Not any.
14. But little if any.
17. Mostly water-lime cement on banks of clay.
18. Pretty much entirely.
19. Clay on surface, and water in quicksand, in all instances.
20. 25 to 35 feet south of ridge, and 10 to 20 feet north of ridge.
21. Clay only, above quicksand.
22. Seem to be quite irregular.
23. Know nothing about it. In an attempt to sink an artesian well we went down

* The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

about 200 feet; first 12 or 15 feet clay, and the rest all quicksand, excepting in two or three instances layers of clay, from 1 to 8 inches thick, were penetrated.

24. Generally 20 to 50 feet I should say.

25. ———.

27. Generally.

28. I know one well, that has been inclosed in a kitchen built long since the well was dug, where the water is vile in taste, thick with dust, rotten wood (from curbing which is nearly always used in the process of construction in consequence of quicksand, and is seldom removed,—bricked inside the curbing), etc., and although I have expected to see typhoid or like difficulties result, I have thus far been happily disappointed.

30. Water clear, cool, pleasant to the taste, (*i. e.*, tasteless) hard, and, in my opinion, healthful.

31. In *old* wells where the curbing was not removed—in wells with decaying wooden pumps, etc., the water has a bad taste, and bad odor, and though I have never subjected it to analysis, it must be detrimental from organic impurities.

In the wells where the curbing was drawn out; and in a few wells here that were constructed without any wood about them, the water is good.

32. Lead, zinc and galvanized iron, certainly injure the water. But little occasion for the use of such in our wells here, however.

33. Unless so poorly protected as to admit surface water directly into the top of the well—has happened here in a few instances—rainfall does not perceptibly affect our well water.

34. Graveyard remote.

35. Do not now recall any.

36. ———.

Very truly,

G. E. CORBIN, M. D.

St. Johns, Feb. 16, 1876.

REPLIES BY JOHN P. WILSON, M. D., OF PONTIAC, MICH.

Replies to Circular No. 7:*

1. City of Pontiac, but none of the conditions of a crowded city.

2. Wells.

3. Have no public sewerage.

13. But one, at new Asylum not completed.

14. None, or next to none.

17. Stone, brick, and many plastered on clay.

19. Sand, gravel and clay loam.

20. 20 to 30, a few 50 feet.

21. Varying as above in 19.

22. Do not know.

23. Whole city underlaid with stratum of blue clay, struck at 20 to 30 feet from surface and 25 to 35 feet in thickness.

24. 30 to 40 feet; a very few less and many more than that.

25. Not many cesspools, but the distance about the same.

27. Generally without danger of contamination.

30. Except a few shallow wells on river flats subject to overflow and surface drainage; water is very clear, hard, and contains no dangerous amount of organic matter.

33. Abundant rains have given plenty of water, but no other change.

P. S.—Questions having no relation to this city are omitted.

JOHN P. WILSON, M. D.

Pontiac, Mich.

REPLIES BY O. MARSHALL, M. D., OF NORTH LANSING, MICH.

Secretary of the State Board of Health:

DEAR SIR:—In reply to Circular No. 7, "relative to water supply:"*

1. Northern part of the city of Lansing, called North Lansing.

2. Wells.

*Replies by Dr. Wilson were published in last Report, but some of these are more complete.
H. B. B., *Secretary.*

*The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

3. No sewers; water often affected by surface drainage.
4. No sewage.
5, 6, 7, 8, 9, 10, 11, 12. Do not apply here.
13. None.
14. Not used for drinking or cooking purposes.
15. ———.
16. ———.
17. Pine tubs in a majority of instances.
18. Universally used for drinking and cooking.
19. Clay and sand.
20. Open wells 10 to 20 feet; "drive wells" 20 to 40 feet.
21. Top soil, yellow clay, blue clay, and quicksand.
22. I think to the west.
23. Quicksand between clay.
24. Average about 40 feet.
25. Few cesspools.
26. ——.
27. Danger of contamination from surface drainage.
28. Color and taste often changed by surface drainage.
29. No.
30. Hard. In surface wells turbid after heavy rains.
31. Nothing in particular.
32. ——.
33. ——.
34. None.
35. Two cases of typhoid fever occurred in the family of Frank Alsdorph, Block 50, facing Capitol avenue, Nov., 1873. On examination the well was found to be about 12 feet deep, planked up instead of being laid with stone or brick. These plank were decayed and covered with fungi, many of which had fallen into the water. At the same time there was an overflowing privy on the west end of the lot.
36. Refer you to my report on epidemic of scarlet fever. [a]

O. MARSHALL.

North Lansing, Aug. 10, 1876.

REPLIES BY J. M. LOOP, M. D., OF PORT SANILAC, MICH.

Secretary of the State Board of Health, Michigan:

DEAR SIR:—Below you will find my reply to Circular No. 7, relative to water-supply: [*]

1. Village.
2. Wells.
3. None.
18. Principal water used is from wells.
19. Most of the wells are in clay loam; some of them in sandy soil.
20. About 12 feet in the sandy soil, and about 30 in the clay loam.
21. Sand in the shallow wells; and a surface soil of from two to four feet, and from 20 to 25 feet of clay reaching the gravel where water is found.
22. Towards the lake, east.
23. Clay.
27. Yes, they are supposed to be.
28. Yes, from one well, last winter, by imperfect sewerage.
29. No.
30. Clear. It probably does contain organic matter. It is hard.
32. Vessels, such as tea-kettles, are incrusted with the carbonate of lime.
34. No relation.
35. Would refer to detailed cases, given last winter, from the use of impure water.[b]

Respectfully,

Port Sanilac, Mich., Aug. 23, 1876. J. M. LOOP.

[a] Published in this Report; see pages 41-52 of this volume.

[b] Dr. Loop's interesting account of these cases is to be published in this Report, and may be found by means of the index, under the head of "Contributions to the Study of the Cause of Typhoid Fever," or, "Fever at Port Sanilac." H. B. B. *Sec'y.*

[*] The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

REPLIES BY ROBERT JOHNSTON, M. D., OF MILFORD, MICH.

Secretary of the State Board of Health:

DEAR SIR:—I take pleasure in replying (to the best of my ability) to your Circular No. 7.*

1. Village of Milford; population 1,500.
2. From wells.
3. No sewers constructed here. Drainage entirely surface.
4, 5, 6, 7, 8, 9, 10, 11, 12. Not applicable here.
13. No artesian well here.
14. Only for washing.
15. No.
16. No.
17. Hydraulic cement, on walls of earth, brick, or stone.
18. Exclusively, for drinking and culinary purposes.
19. Part of village is built on sandy soil and part on clay soil.
20. 30 to 60 feet; would average about 45 feet.
21. Clay (yellow and blue), sand and gravel.
22. The Huron river flows through the village from east to west. Strata seem to dip towards the river from hills to the north and south of it.
23. Do not know, but believe it is clay; know it is blue clay that maintains the water in mine.
24. 50 to 75 feet.
25. No cesspools here.
26. Have observed none.
27. I think the danger, if any, is very slight. The water used here is good, and seems to be very healthful.
28. Have known of no case of the kind, except from rats or other animals having fallen into the well.
29. No.
30. Clear; does not contain organic matter in dangerous form or amount; is hard.
31. Nothing.
32. Nothing.
33. Have not noticed that the quality was affected unfavorably by either of the conditions named.
34. Cemetery is located half a mile above village on south side of river. It slopes from a road 50 rods south of river down to the water; drainage is into river. The water-supply of village is not apparently affected by it.
35. The only cases of typhoid fever I have seen in the village (four in number) all occurred in one family. I examined the premises thoroughly for a cause, and found nothing to suspect, except the water which had been used. This was supplied from a drive well 30 feet deep, the only strata penetrated being sand and gravel. Soil in vicinity, light sandy. The barn and privy are located 60 feet from well, but the ground slopes a little towards well, so that this spring, before the frost was out, there was a pool of water ten or twelve inches deep standing for several days about the well. When the frost was out of the ground, this pool of water, which was colored by the manure in barn-yard, disappeared by sinking down into the sandy soil. The first case, a boy aged 10, was taken with diarrhea, and fever of a low grade, June 20. He soon became delirious, and in ten or twelve days the rose-colored spots, characteristic of typhoid fever, appeared. In about a week after this boy was taken, his sister, aged eight years, was taken with similar symptoms, but less severe. A few days later a brother, aged sixteen, and a few days afterwards the youngest child, a girl aged six years, came down with the same disease. The last case was the most severe,—was characterized by delirium, rose-colored eruption, and involuntary evacuations of bladder and bowels. There were but four children and the mother in family. The mother had prodromic symptoms. Her husband was absent all winter and spring, and had no fever. The children all recovered. I could discover nothing wrong with the water.
36. Have observed nothing, except as referred to in answer to 35.

Very respectfully yours,

ROBERT JOHNSTON.

Milford, Oct. 14, 1876.

*The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

Beside the replies of regular correspondents of the Board in this State, Prof. C. F. Chandler, M. D., Ph. D., President of the Board of Health of New York City, and E. G. Janeway, M. D., Commissioner of Health for the same city, have kindly returned a copy of Circular No. 7, endorsed with brief replies to the questions therein, and have also sent a valuable and interesting pamphlet article by Prof. Chandler on the "Sanitary Chemistry of Waters."

This brief statement of the water supply of New York City, including the analysis of the Croton water, is here inserted, and will permit convenient comparisons with analyses and conditions in this State.

REPLIES BY C. F. CHANDLER, M. D., PH. D., AND E. G. JANEWAY, M. D., OF NEW YORK CITY.

Secretary State Board of Health:

SIR:—Replies to Circular No. 7 on water supply.*

1. City.
2. Croton river.
3. Water is derived from 339 square miles of agricultural and wood land, 40 to 60 miles from the city.
4. No such relation.
5. From stream, flow constantly south.
6. 40 to 60 miles.
7. Brick and iron.
8. Several large reservoirs.
9. None.
10. 100,000,000 gallons.
11. 100,000,000 gallons.
12. 100.
13. By a few factories, "drive wells."
14. Little, if any.
18. Only in the northern wards.
19. Gravel.
27. Not always.
28. Occasionally,—spring,—scouring of frozen ground on melting of snow.
29. [Several analyses of different waters were sent. Below is an analysis of the Croton water.]

The Croton water contains in one United States gallon of two hundred and thirty-one cubic inches, the following *normal* impurities:

Croton Water.—Grains in one U. S. Gallon.

Soda	0.326	Silica	0.621
Potassa	0.097	Carbonic Acid	2.604
Lime	0.988	Organic and Volatile Matter	0.670
Magnesia	0.524		
Chlorine	0.243	Total	6.395
Sulphuric Acid (SO_3)	0.322		

30. Water entirely above suspicion.
31. None.
32. A little lead.
33. Makes it turbid.
34, 35, 36. None.

E. G. JANEWAY, M. D.,
Commissioner of Health.

C. F. CHANDLER,
President Board of Health, New York City.

*The figures beginning paragraphs refer to questions in Circular [7], printed on pages 84-5 of this Report.

REPORT

ON

THE WATER SUPPLY OF MICHIGAN.

By ROBERT C. KEDZIE, M. D.,

MEMBER OF THE

State Board of Health,

PROFESSOR OF CHEMISTRY IN THE STATE AGRICULTURAL COLLEGE, ETC.

REPORT ON THE WATER SUPPLY OF MICHIGAN.

BY ROBERT C. KEDZIE, M. D.

INFLUENCE OF GEOLOGICAL FORMATION.

The peninsula of Michigan lies in an immense geological saucer, the outcrop of the strata being found in successive circles as we approach the borders of the State, proceeding from the center of geological depression. The rocks are, 1, sandstone; 2, coal measures (clay, shale and sandstone); 3, sandstone; 4, carboniferous lime-stone; 5, Michigan salt group, etc.

In certain portions of the State where we approach the outcrop of the saliferous sandstone, deep wells contain water which is brackish from the presence of salt and chlorides of calcium and magnesium. In a large portion of our State deep artesian wells pierce the salt-bearing sandstone, and the production of salt is one of our notable industries. In only a few localities are the wells for domestic use affected by these deeper deposits of salt. In a few places, *e. g.*, Alpena and Wyandotte, the water in very deep wells is more or less charged with sulphuretted hydrogen.

The water in our rivers, lakes, springs and wells is more influenced by the soil than by the subjacent rock formations. The soil is *drift*, and varies widely in composition and texture from plastic clay to drifting sand. The most of our soil is made up of a mixture of silicious sand, clay, oxide of iron, carbonates of lime and magnesia, and vegetable mould. It also contains sensible quantities of sulphate of lime. Very extensive beds of "plaster" are found in our State. Our soil-water is hard, having the elements of both temporary and permanent hardness. The water in very deep wells which do not reach the salt measures is strongly marked in temporary hardness from the excess of bicarbonates of lime and magnesia which they hold in solution.

But the office of the soil with respect to water supply is not limited to charging the water with alkaline and earthy salts; its action as a purifying agent is one of great importance.

PURIFYING ACTION OF SOIL.

The soil may act upon water by its mechanical and by its chemical properties, and its purifying influence may consist in the mechanical removal of suspended impurities, or by oxidation or other chemical action upon impurities, whether held in suspension or solution. The chemical action of the soil as a purifying

agent is much more important in a sanitary point of view than its mechanical action, because deficient action of the latter class is readily revealed to the eye, while want of chemical purification may not be detected by any of the senses, and can be detected only by chemical reagents.

As soils vary widely in their composition, perhaps we shall get a better idea of its action on water containing impurities by considering separately the action of the different constituents of the soil.

1. *Sand.*—Pure silicious sand acts simply as a mechanical filter to remove suspended impurities. It has no chemical action on any of the impurities held in solution, has no absorbent action over them, and has of itself no oxidizing agency. By its porous condition it allows free entrance of air, and the oxygen thus brought in contact with a very large surface of water held by capillary action on the surface of the grains of sand, may exert a marked oxidizing influence, and the sand may thus indirectly act as an oxidizing agent. In sandy soils we find that oxidation of organic matter is rapid, but this is only an indirect effect of such soil in consequence of its porous condition. The only direct office of sand is to act as a mechanical filter.

Filtration through such a soil is rapid, and hence we find that sand, of all the components of the soil, stands lowest in the scale as a purifying agent. It is rare to find pure sand; it almost always contains oxide of iron, etc., and its action will be modified by these foreign materials.

2. *Clay.*—From the finer division of its particles, clay is a much more perfect mechanical filter than sand. But it has more than a mechanical action. When a dark colored and strong smelling solution of manure is filtered through a clay soil, the whole of the coloring and odorous matter is withdrawn from solution. The solution is not only physically altered, but its chemical composition is changed; ammonia, the soluble phosphates, and most of the potash, are withdrawn from solution. The tendency of all aluminous compounds to form double salts, imparts to clay a chemical activity of singular power. Clay therefore has purifying powers of a pronounced order. Its oxidizing influence is only inferior to sand, in the fact that its compact structure does not so readily permit the entrance of air.

3. *Oxide of Iron.*—The hydrated oxide of iron is quite abundant in the soils of our State, imparting a reddish-brown color to the soil. Indeed, but for the oxides of iron and manganese, and for vegetable matter in soils, all soils would be nearly as white as snow.

The hydrated oxide of iron has absorptive properties similar to those of clay. It has a singular power of fixing ammonia. The oxide of iron in soils, and even bog-iron ore contains ammonia; for if it is boiled with caustic potash, sensible quantities of ammonia are given off.

The oxide of iron has marked oxidizing properties of its own; it does not act like sand or clay to merely expose a large extent of surface of liquid charged with organic matter to the action of the air, but it is itself an oxidizing agent of peculiar properties. The capacity of iron to exist in two states of oxidation, and of passing readily from one degree of oxidation to another, yielding up its excess of oxygen in the ferric state to organic bodies, oxidizing them while it is itself reduced to ferrous oxide, and of again taking up oxygen from the air and thus passing back to the state of ferric oxide, renders this substance an agent of singular power in the chemistry of the soil. Like the red globules of the blood of the animal, the oxide of iron is the oxygen carrier of the soil.

The readiness with which a nail exposed to the weather will oxidize the wood

through which it is driven so that the board soon hangs loose upon the nail, is an illustration of the oxidizing power of iron rust. It also oxidizes the unoxygenated sulphur compounds, and other malodorous substances in the soil. So also its power to combine with and fix in harmless combination many poisonous substances in the soil is one safeguard against practices otherwise fraught with danger; *e. g.* its power to fix the compounds of arsenic and copper, used as insecticides. Among the water purifiers of the soil therefore, the oxide of iron holds a prominent place.

4. *Humus.*—The vegetable matter of soils contains a number of organic acids which have a remarkable affinity for ammonia, which fix it in an insoluble form for the most part. Humus also powerfully absorbs, and deodorizes the offensive gases which are evolved by decomposing animal substances. If a putrefying animal substance is buried a few inches in vegetable mould or muck, all odor rapidly disappears and will not reappear if the covering is maintained.

5. *Lime and Magnesia.*—The carbonates of lime and magnesia do not act merely by charging the water in the soil with these salts and thus conferring temporary hardness. While they are not directly oxidizing agents, they accelerate decomposition of organic substances by maintaining an alkaline condition in the soil, it being found that the decomposition of an organic substance in the soil is slow in an acid condition of the soil. They have a marked influence in converting the organic compounds of nitrogen into nitric acid. Hence these alkaline earths are always used as ingredients in a nitre bed,—and the soil is only a nitre bed on a very large scale.

We thus see that the soil, which is made up of these various constituents, is both a mechanical and a chemical filter; a filter on a vast scale, but of limited powers. When a limited quantity of soil is treated with sewage, the pores of the soil soon become obstructed, preventing the passage of the water; its power to fix and remove organic matter in solution is soon exhausted, and we then have "soil saturation." Unfortunately the chemical powers of such a soil may be exhausted long before there is mechanical obstruction to the passage of the water, and the effluent water may be

"Sparkling and bright in its liquid light,"

and yet be a vehicle of death. To regard *clear* water as *pure* water is a common and mischievous error. *Clear* and *clean* are not always synonymous.

Permit me to say a few words concerning what would be grounds for regarding with suspicion any water so far as potable or culinary use is involved. A water may properly be rejected because of the presence even of substances which are not in themselves injurious. Thus common salt in moderate amount is beneficial to the animal system, yet its presence in any sensible amount would lead us to reject such water because it would indicate probable sewage contamination. Soluble phosphates would be still stronger ground for rejection, for the same reason.

It might be supposed that nitrates in water would not be a ground for objection, because they indicate the maximum of oxidation of nitrogenous substances; but I regard the presence of nitrates in sensible amount as ground for suspicion as indicating a large amount of substances of this class to be oxidized, and because of the danger that the chemical capacity of the soil may reach its limit, especially if not reinforced by the entrance of air by intermittent filtration.

The presence of nitrites is justly regarded as very suspicious. As nitrites

indicate a certain degree of oxidation of nitrogenous substances, and as the nitrites are not in themselves injurious, some may ask, why should their presence in any water be considered sufficient ground for its rejection? Nitrites may be present in any water from two causes: 1st. *Incomplete oxidation of organic bodies,* which would show that the oxidizing capacity of the soil was already overtaxed. 2d. *Reduction of nitrates by some deoxidizing agent.* This reduction may be effected by innocent agencies; thus I find that freshly precipitated ferrous oxide placed in a solution of nitrate of potash will in a few days reduce a comparatively large amount of nitrate to nitrite, and will even form ammonia from the reduced nitrate. This reduction may also be effected by albuminoids, by starch, or by any putrefying organic body. Meusel has lately pointed out the fact that bacteria in the presence of alkaline nitrates cause their reduction to nitrites. The presence of bacteria is so intimately associated with putrefactive decomposition as to justly awaken our fears when the indirect products of these bodies are found in any water. But be the nitrites formed by either process—by imperfect oxidation or by reduction—their presence in any appreciable quantity in any water is sufficient cause for its rejection for potable and culinary use even if the nitrites are not *per se,* injurious.

INFLUENCE OF RAINFALL, ETC.

Rain water, so far as either organic or inorganic matter is concerned, is the purest natural form of water we have. If the water in the soil contains any impurity, the rain water serves to dilute this, and proportionately diminishes the danger. But when there is a protracted drought, if the water is derived from comparatively superficial sources, we have a concentrated watery extract of the soil.

The same result may be reached by the action of frost, because water in freezing excludes all foreign substances, whether solids or gases, and the matter excluded in the freezing of a part of the water may remain in solution in the remainder of the water. This may in part explain why typhoid fever so often prevails, and is so severe in type during very cold winter weather. The pure, bracing, ozonized air of winter would lead us to expect immunity from such diseases; but the same conditions which give us pure air may greatly concentrate impurities in the other great natural purifier. In this State typhoid fever is usually more severe and intractable in winter than in mild non-freezing weather. The thawing of the ice produces the same effects on water supply as a heavy fall of rain.

SOURCES OF WATER SUPPLY.

Michigan is surrounded on three sides by large lakes whose water is very pure as well as abundant. In the interior of the State there are a great number of small lakes which may serve for the water supply of future villages and cities.

In the rural districts of this State the most common source of water supply for domestic use is the well. The usual custom is to dig a well to such depth as to reach a sufficient supply of water; the well is then bricked or stoned up, occasionally it is curbed with wood; a platform is constructed over the mouth of the well, or the mouth is often left uncovered to "air the well." A very frequent result is that various forms of animal life fall into the well and decay there, their presence not being detected till the water becomes offensive, when "the well is cleaned out," and this process is repeated *ad indefinitum, et ad nau-*

seam! The wooden platform receives the drip of the pump or bucket, decay soon follows, and the products of decomposition are washed back into the well; leaves and vegetable matters swept along by the wind readily fall into the well, and insects and worms find in it a ready tomb. Surface drainage is apt to find ready access into such a well. As the well is usually located in convenient proximity to the kitchen door, and as the kitchen slops too often are simply thrown out on the ground to be absorbed by the soil, the well often becomes polluted by drainage from such saturated soil. The privy, whose vault is simply a blind well, is often placed near the well, and if the soil is porous, or if its capacity for purifying is saturated, the result is fœcal contamination of the well water. Many families *have a well* but *are not well!* Typhoid fever may visit such a household, and if the physician does not seek out the cause, this state of danger may continue indefinitely unless death serves an injunction on their further use of such water. With blind fatalism many a man bows his head before "this mysterious providence." It is high time for sanitary science to clean and disinfect these mysterious providences!

Another disadvantage of this class of wells is that they are too shallow, the sinking of the shaft being stopped whenever a reasonable supply of water is reached. The result often follows that the well goes dry in any period of protracted drought; it receives at all times water from any shallow veins of water which are most liable to be contaminated with surface impurities; and the water is apt to be warm and insipid in hot weather. The brick or stone walls laid up without mortar or cement do not prevent the entrance of worms, etc. For ten or fifteen feet from the surface the walls should be impervious to water and every form of living matter. This can be secured only by the use of good cement or water lime.

Bored Wells.—Another method of sinking wells is by boring with an auger 15 or 20 inches in diameter and sinking hard-burned tiles of the same diameter in the hole. If these tiles fitted into each other water-tight so as to exclude all surface water, very good wells might be constructed in this way; but as now made they are little, if any, better than the ordinary well.

Drive Wells.—A third kind of wells is coming into use in this State which promises excellent results. These are made by driving gas pipe 1¼ inches in diameter into the ground till permanent and pure water is secured. The deepest portion of the tube consists of a finely perforated strainer, which excludes all solid matter except very fine sand, which is soon removed by pumping; and if the strainer is in a layer of gravel, an abundant supply of clear water is usually secured. In the proper kind of ground, wells are thus secured which are free from all the objectionable features of ordinary wells. All surface water is excluded; no solid organic matter such as accumulates in ordinary wells, can enter; the wells can be carried down through quicksands to any desirable depth, and water can be obtained which will scarcely vary in temperature throughout the year. A well on my grounds, 44 feet deep, yields water which does not vary more than one degree in temperature throughout the year, varying but a trifle from 47° winter and summer. These wells are cheap, durable, and better protected from contamination of all kinds than any other kinds of wells in our State.

Artesian Wells.—A number of artesian wells have been sunk in our State. Many of these reach the saliferous sandstone, and the water is too much charged with chlorides and bromides of sodium, calcium and magnesium to be fit for domestic use. The water of wells which do not reach the salt-bearing rock are charged with considerable quantities of bicarbonates of lime, magnesia,

soda, etc. The iron pipes of these wells being nearly in the line of the magnetic dip, were found to be strongly magnetic, and for a time great excitement was caused by the supposition that the water was magnetic, and hence supposed to be endowed with remarkable curative properties.

CONTAMINATION OF WATER BY DECOMPOSING ORGANIC MATTER.

Influence of Graveyards.—Many persons receive with an incredulous smile the suggestion that graveyards may be a source of contamination of well water, even when the well is some distance from the cemetery,—that graveyards may not only be a receptacle for the dead but a source of death.

The subterranean reservoirs or currents of water which supply our wells are derived from rain water; this falling upon porous soil sinks vertically, unless it comes in contact with impervious strata of soil such as clay or stratified rock, when it may flow off horizontally to a great distance. If this rain water come in contact with vegetable matter in the soil, it will take up a certain amount of carbonaceous matter or humus, which may not be especially injurious unless in large amount. But the case is quite different if this water come in contact with decomposing animal matters, because the animal tissues in undergoing putrefactive decomposition give rise to very complex products which are very soluble in water, and are extremely injurious to the quality of potable water. Unless this water filters through such a quantity of soil, and soil of such quality as will completely remove these products of decomposition, such water is unsafe to use for domestic purposes, however far it may have passed under ground.

Soon after the close of the Franco-Prussian war, Jules Lefort read a paper before the Paris Academy of Medicine on "the alteration of well waters by the proximity of cemeteries." Speaking of water which has washed putrefying animal matters, Lefort says: "Thus nitrogenized organic matter and salts of ammonia are the dominant principles that water which has leached animal matters in putrefaction always takes up in large quantities and which filtration through the soil does not separate completely. As long as this water is preserved from the action of the air and heat it preserves its transparency and limpidness. Its odor is very slightly nauseous and the taste only a little mawkish, but if it remains some time in the air, and especially if the temperature is elevated, the nitrogenized organic matter which it holds in solution, enters into a new phaze of decomposition; the water becomes thick, its odor becomes more and more disagreeable, repulsive even, and then we commonly designate it by the name of stagnated water. This is the mode of alteration of the stagnant waters of pools, and the same is to be noticed in certain well waters which according to the following observations have previously stood a longer or shorter time in the graves of cemeteries, and which have afterwards been exposed to the air and heat of summer."

M. Lefort then gave the facts which he had brought to light in regard to a well fifty metres (ten rods) from a cemetery in the parish of Saint Didier, in which M. Lefort made his home for several months in the year. The water when first drawn from the well had no bad odor, but had an insipid taste not found in running water of good quality. Ten litres of this water evaporated to dryness gave a dark grey residue having a slightly disagreeable odor; when warmed it gradually became colored dark brown, giving off a "burnt" odor; treated with hydrochloric acid, it gave off gas having an odor between that of a concentrated solution of glue, and that of butyric acid; another portion mixed with hydrate of lime gave off ammonia in notable quantity. The water

of other wells in the vicinity, but removed from the cemetery did not give these results. "Furnished with these indications, I thought it my duty to point them out to the present curate of the parish of Saint Didier, and then he remembered that his predecessor had ceased using the well of the parsonage because, without being able to explain the reason, he had observed several times that the water had a repulsive odor. This curate told me afterwards that he himself had ascertained, without seeking the cause, that during the heat of summer, and at certain times, this well became tainted very quickly, and it had then a slightly putrid odor, and afterwards a mawkish taste. It is evident to me that this well receives, if not constantly, at least from time to time and under the influence of atmospheric variations, water which has previously infiltrated in the graves of cemeteries."

By the decree of June 12, 1804, it was forbidden to bury within the precincts of cities, towns and villages, and it was directed that ground be consecrated for that purpose at a distance of at least 35 to 40 metres (7 to 8 rods) beyond the boundaries of these centers of habitation. These measures being found insufficient, a decree was issued four years after that "no one could without authority build any dwelling or dig any well at less than 100 metres (20 rods) from the new cemeteries, transferred outside the parishes, and that the old wells should be filled up at the demand of the local police."

M. Lefort then asks if the distance of 100 metres is *always sufficient* to guard against contamination of well water by cemeteries; and thinks it is not sufficient. He continues: "Ought we not to fear that these infiltrations, charged with soluble organic remains, may circulate subterraneously over a considerable space and carry with them the cause of a permanent or temporary unwholesomeness? And finally who would not shudder at the idea that waters destined for drinking,—that is for the first need of life,—had previously washed corpses in putrefaction, after having assisted at divers phenomena of this sort of fermentation?

"Since M. Devergie has so well shown the different phases of the decomposition of dead bodies, the facts which precede are easy to explain. When the graves are invaded by water, as often takes place, the putrid fermentation without being stopped follows a slow and regular course; but when, in consequence of the dryness of the soil beneath, these waters infiltrate further, and leave the graves drained, the putrid fermentation acquires a new and greater intensity, until other waters come to take up the soluble putrid matters and carry them everywhere where the ground offers drainage. We see, then, how important it is for the public health to remove dwellings as far as possible from places of sepulchre, and to place the latter where they will not be drained into reservoirs of water for domestic use."

A translation of M. Lefort's valuable article may be found in the American Chemist for June, 1872.

Unfortunately we need not go to France to learn what is the influence of graveyard water on the public health. In February, 1875, I received a letter from Dr. Chipman of Grand Rapids, calling my attention to the serious sickness which had prevailed in families living on a certain alley in that city. From this letter I gather the following facts: There is a graveyard in Grand Rapids called the Fulton Street Cemetery. The soil in this cemetery to the depth of ten to fifteen feet is gravelly and sandy, and beneath this porous soil is a tenacious clay which dips to the east towards the alley, on which are ten houses. The people living in these houses derive their water from wells which

penetrate two or three feet into this clay. In seven of these ten houses severe sickness of a typhoid or typho-malarial type prevailed, the sickness lasting from fifteen to thirty-five days. In the family which has lived longest on the alley, of six persons five had the fever, three of them in a very severe form. Some of the wells were not more than twenty feet from graves. The impervious clay here served as a water-shed to convey the filtration of the graves directly into the wells, and these poor people were drinking a *cold infusion of death!*

I omit all discussion of sewage contamination as influencing the public health because another member of this Board is preparing a report on this subject, and I am glad to leave it in so able hands.

IS THE SOIL A SANITARY FILTER?

We have seen that the soil is both a mechanical and a chemical filter; that its power as a filter varies with its chemical composition and physical texture, but at the best its purifying power is limited. Can we regard the soil as an effectual *sanitary filter?* Is it capable of destroying or completely arresting disease germs? Will the poison of cholera or of typhoid fever be arrested when the liquid evacuations of such patients are filtered through the soil?

The remarkable facts which were recently reported from Switzerland where the poison of typhoid fever mixed water was *transmitted through nearly a mile of porous earth and then became the cause of a remarkable outbreak of typhoid fever,* would seem to show that the power of a soil as a sanitary filter is very feeble. I make the following extracts from a communication by Prof. Frankland: "The outbreak of typhoid fever occurred at the village of Lausen, near Basel, in Switzerland, and it was exhaustively investigated by Dr. A. Hägler, of Basel, who has given a full account of it in 'Deutsches Archiv. F. Klin. Med., XI.' The source of the poison was traced to an isolated farm house on the opposite side of a mountain ridge, where an imported case of typhoid, followed by two others, occurred shortly before the outbreak. A brook which ran past this house received the dejections of the patients, and their linen was washed in it. This brook was employed for the irrigation of some meadows near the farm house, and the effluent water filtered through the intervening mountain to a spring used in all the houses in Lausen, except six, which were supplied with water from private wells. In these six houses no case of typhoid occurred, but scarcely one of the others escaped. No less than 130 people, or seventeen per cent. of the whole population, were attacked, besides fourteen children who received the infection whilst at home for their holidays, and who afterwards sickened on their return to school.

"The passage of water from the irrigated meadows to the spring at Lausen was proved by dissolving in it at the meadows 18 cwt. of common salt and then observing the rapid increase of chlorine in the spring water; but the most important and interesting experiment consisted in mixing uniformly with the water 50 cwt. of flour, not a trace of which made its way to the spring, thus showing that the water was *filtered* through the intervening earth, and did not pass by an underground channel."—*Nature, Vol. 13, p. 447.*

The full details of this remarkable outbreak of typhoid will be eagerly sought by sanitarians. It will be a matter of interest to know the amount of water discharged by the spring, and the kind of soil through which it had filtered. We are only informed that it was porous.

If a mile of even porous earth is not an adequate sanitary filter, can we safely rely on a few feet or even rods of any kind of soil as an effectual sanitary filter

to arrest disease germs or infectious poison? In the disposal of the infectious dejections and ejections of patients with typhoid, cholera, etc., we ought not to depend upon the purifying influence of the soil, but they should be disinfected at once before they are placed in positions where, by any possibility, they may find their way to sources of supply of potable water.

WHAT WATER SHALL WE USE?

The choice of water for domestic use has a very important bearing on the health of a family, and persons cannot be too careful in making their selection of this prime condition of healthy physical existence. It is better to fee the sanitary engineer than the doctor and the undertaker.

1. *Rain Water*—The purest natural water is rain water. Many persons have claimed that the excellence of rain water consisted in its freedom from mineral matter; but this is but a slight ground for superiority. Indeed it is claimed that a certain degree of hardness from presence of lime improves the quality of water for all domestic uses, except washing, and water from the chalk districts is preferred in Europe to softer waters derived from other sources. The chief excellence of rainwater consists in its freedom from organic matter. In many parts of the country where the soil-water is of poor quality, rainwater has been substituted with a marked improvement in the health of the consumers, there being a manifest decrease of diseases of malarial origin, dysentery, etc.

But to preserve rainwater in a pure condition it must be stored in cisterns, which are impervious to drainage water from the surrounding soil; it must also be preserved from any possible contamination by gaseous exhalations. Often the overflow pipe of the cistern is made to pass through the vault of the privy or the cesspool to wash out these by the escaping water, but the cistern water is almost invariably made offensive in a high degree, and very unwholesome by such arrangement. Indeed a more unsanitary arrangement could hardly be constructed. The cistern should be well sunk in the ground to keep the water cool in warm weather and prevent the water from freezing and the cistern from being destroyed in very cold weather.

The water should be preserved from all contamination before it enters the cistern. Doves and any fowls that spend much of their time on the roofs of houses, often injure the water; their droppings on the roof are washed into the rain trough and thence into the cistern. A certain quantity of cellulose or "weather-beat" is washed from the shingles and is deposited in the cistern; leaves of neighboring trees often follow the same course or accumulate in the eave-troughs, and the products of their decomposition are carried into the cistern. To remove matters held in mechanical suspension it is a good plan to provide a small filtering cistern filled with clean sand to receive the water as it flows from the rainwater pipes, carrying this water after filtering through the sand directly into the main cistern by a lateral pipe connecting the two cisterns.

A very simple and inexpensive arrangement will exclude all insoluble impurities from cistern water as it is pumped out. This is constructed as follows: A brick box, 12 to 18 inches in internal diameter and 12 inches high, is made with well burned, hand-pressed brick (machine-made bricks are too hard and impermeable by water), laid up with water-lime (the bricks may be laid up edgewise), the box is arched over at the top, and through this arch the pipe of the pump passes inside the box, the pipe being securely fastened in the arch by water-lime. When the pump is worked, the water that reaches the pipe must pass through the brick, by which means all mechanical impurities are prevented from passing to the pump: the water is strained before it is pumped.

It is important that cisterns be made of large size so as to afford an abundant supply even during a drought. A cistern that will hold one hundred barrels will cost but little more than one that holds fifty barrels. The rain-water that falls in a heavy rain is purer than that which falls in a small shower, because the first rain that falls washes out most of the impurities in the air, and such water is always found to be less pure than the rainfall nearer the close of a long storm. If the rain only of heavy storms be collected and stored, turning off the rain of small showers, better quality of water will be secured.

The cistern should be made of brick laid in water-lime mortar, and should be thoroughly plastered with water-lime mortar on the inside; it should be arched over, leaving only a "man-hole" at the top. No wood should be used in its construction except the cover of the "man-hole." The cistern should be thoroughly cleaned at least once a year.

2. *Spring Water.*—Many persons esteem spring water the best kind of natural water. The quality of the water depends somewhat on its source; if it comes from great depth and has flowed through a long belt of gravel, and flows rapidly, it is often of good quality. But many things are called springs which are little more than shallow pits filled with water oozing from their marshy surroundings, with little or no outflow. The water from such a spring may be of very objectionable quality. A flowing spring is better than a well under the same circumstances, because the outflow of the water serves to wash away any accidental impurities by its constant renewal. The very volume of the water flowing is a safeguard, unless the water is derived from polluted sources.

3. *River Water.*—River water generally contains more suspended impurities than spring or well water; it is usually warmer and more insipid than other kinds of soil water, and also softer from containing less carbonate of lime. Water that flows rapidly is more oxygenated and free from dissolved organic matter than sluggish water. The quality of river water depends largely upon the relative amount and quality of sewage and drainage which it receives.

4. *Well Water.*—In a porous soil a well drains an inverted cone of soil, the apex of which is the bottom of the well. "In very loose soils a well 60 or 80 feet deep will drain a large area, perhaps as much as 200 feet in diameter, or even more, but the exact amount is not, as far as I know, precisely determined. Professor Ansted states that the deepest (non-artesian) well will not drain a cone which is more than half a mile radius."—*Parke's Hygiene, p. 25.*

The quality of well water therefore depends very much upon the surroundings of the well. In every well the surface water should be excluded carefully, and no water permitted to enter the well till it has filtered through the greatest possible extent of soil; in other words, the water should enter the well *only at the bottom.*

From this hasty view of the quality of soil water it will be seen that it is difficult to say which is the best form of soil water; but the case becomes different when from density of population or other causes we have saturation of the soil and its purifying power exhausted. In such cases all soil water of the vicinity should be rejected, and either rain water should be used or water brought from sources beyond the area of contamination.

TESTS OF THE QUALITY OF SOIL WATER.

The question of the fitness or unfitness of soil water for domestic use can be absolutely determined only by a careful chemical analysis. But many persons who would not wish to incur the trouble and expense of a chemical analysis

will yet desire some popular means of testing the water they use. The following methods of testing such water are presented, not as the most complete possible, but such as any one can employ without the skill and appliances of the practical chemist. If such tests cast suspicion upon the quality of the water, and especially if the water appears to cause sickness in any one using it, the water should be changed, or else a careful analysis should be made by some competent chemist.

Color.—Fill a large bottle made of colorless glass with the water; look through the water at some black object; the water should appear perfectly colorless and free from suspended matter. A muddy or turbid appearance indicates the presence of soluble organic matter or of solid matter in suspension. It should be "clear as crystal."

Odor.—Empty out some of the water, leaving the bottle half full; cork up the bottle, and place it for a few hours in a warm place; shake up the water, remove the cork, and critically smell the air contained in the bottle. If it has any smell, and especially if the odor is in the least repulsive, the water should be rejected for domestic use. By heating the water to boiling an odor is evolved sometimes that otherwise does not appear.

Taste.—Water fresh from the well is usually tasteless even though it may contain a large amount of putrescible organic matter. Water for domestic use should be perfectly tasteless, and remain so even after it has been warmed, since warming often developes a taste in water which is tasteless when cold. If the water at any time has a repulsive or even disagreeable taste, it should be rejected.

Heisch's test for sewage contamination.—The delicacy of the sense of smell and of taste varies greatly in different individuals; one person may fail to detect the foul condition of a given water, which would be very evident to a person of a finer organization. But if the cause of a bad smell or taste exists in the water, the injurious effects on health will remain the same whether recognized or not. Moreover some waters of very dangerous quality will fail to give any indication by smell or taste. For these reasons I attach especial importance to Heisch's test for sewage contamination or the presence of putrescible organic matter. The test is so simple that any one can use it. Fill a clean pint bottle three-fourths full with the water to be tested, and dissolve in the water half a teaspoonful of the purest sugar,—loaf or granulated sugar will answer,—cork the bottle and place it in a warm place for two days. If in 24 to 48 hours the water becomes cloudy or milky, it is unfit for domestic use. If it remains perfectly clear it is probably safe to use.

AGRICULTURAL COLLEGE, October 9, 1876.

REPORT

ON

METHODS OF COLLECTING VITAL STATISTICS.

By HENRY B. BAKER,

SECRETARY OF THE

STATE BOARD OF HEALTH

AND

Superintendent of Vital Statistics in Michigan.

REPORT ON METHODS OF COLLECTING VITAL STATISTICS.

To the President and Members of the State Board of Health:

GENTLEMEN:—At the annual meeting of this Board in April last, so much of the President's Address as related to Vital Statistics,* was referred to me. The important statements and suggestions by the President of the Board have been carefully considered, and I now respectfully report as follows: Dr. Hitchcock starts with the proposition that "reliable vital statistics must of necessity be the basis for the work of intelligent and practical hygienic art," and this for the reason that in this as in other practical measures "well authenticated and carefully compiled facts" are essential to intelligent and effective action. He brings forward evidence from many sources and from high authorities, all tending to support the view that "the registration of births and deaths and the causes of deaths, is the foundation stone of health organizations."†

To me, the proposition is manifestly true; and therefore I quite agree with our President when he says: "One of the strongest and most persistent efforts of this Board should be to secure more complete and reliable vital statistics of the people of Michigan." The subject being acknowledged to be of such importance to public hygiene, it is, therefore, equally important that any action which may be taken should be previously well considered, and cautiously undertaken. Inasmuch as all such measures for advancing the condition of the people are only with great difficulty first inaugurated, and are subsequently modified with much greater facility, it seems to be desirable to avoid any movement which may lead to an entire abandonment of the system already inaugurated, but by all means to seek out measures for so modifying the present system as will best fit it for advancing our knowledge of the important facts with which vital statistics deal.

MICHIGAN STATISTICS GOOD, BUT MAY BE IMPROVED.

Although it is true there are serious defects in the present system of collection, some of which Dr. Hitchcock very concisely states, it is also true that the present system of vital statistics in Michigan is one of the best now in actual operation, over so large an area, in the United States, and, with two or three exceptions, perhaps in the world. In some *cities* in the United States there are systems in operation which are much better adapted to the collection of the important facts of the numbers, causes and circumstances, of deaths; Massachusetts, Rhode Island, and a few other States have good systems in operation,

*See pages 9-11 of this volume.
†Quoted from Report State Board of Health, Georgia, 1875.

but in very few of the States is there any system, in good working condition. This is so, notwithstanding very great effort has been made by physicians and others for the inauguration of such measures in many of the States, and it illustrates the difficulty of starting any movement of this kind. In this State the present law was not passed until after many years of hard work by physicians and others, who knowing the importance of such action to the people could not conscientiously refrain from advocating a law for this purpose. The prsent law was framed after what was believed to be the best law then existing. Actual work under its provisions has proved that it is not perfect. Some of the imperfect results, however, are due to causes that no law will of itself remove. In fact *the main difficulty in the way of obtaining reliable vital statistics, is a lack of appreciation of the importance of the subject by the people.* Just as soon as the people can "see the use" of being so particular to collect all the circumstances attending every death, just so soon we shall have reliable vital statistics, for our citizens are sufficiently like other people to look out for their own interest when the certainty of that interest once appears plain to them. One of the most important services which can now be performed for the cause of disease prevention is, therefore, such a presentation of the facts concerning the uses and value of those facts which, when collected, we call vital statistics, as will in time convince the great majority of our citizens that their true interests—their interests in the lives and health of themselves, their offspring, and of their fellow citizens—will be very materially advanced by all those measures which increase our knowledge of the number of deaths and the number of cases of sickness from each and every disease that afflicts humanity. Some progress will have been made if it can be understood that when the name of the disease which resulted in death has been carefully stated for each case, the cause of the *disease* still remains to be investigated, and that for such investigation we need to have a full knowledge of all the attendant facts and circumstances.

SPECIAL WORK BEST DONE BY THOSE SPECIALLY PREPARED.

The collection of all these facts involves time and labor that must either be contributed by individuals to the general public welfare, or be paid for by the State. It seems to me that the people should not count upon getting something for nothing, and that this collection must be paid for either by the State or by local government organizations for the general good of the people. Heretofore the difficulty has been that legislators have not sufficiently appreciated the importance of these statistics to be willing to allow State funds to be appropriated in sufficient amount to properly pay for their collection by a person selected for that special service, but only enough to pay for doing the work as an incidental affair by the supervisors and assessors. There is one apparent exception to this statement; in the city of Detroit the statistics are collected by persons appointed by the common council; but the collection is paid for by the city and not by the State. The foregoing shows the reason why the statistics are collected by the supervisors and assessors instead of by persons selected for their knowledge of the subject and their fitness for the work. In ordinary business affairs, men usually select those to perform their work who have special fitness for the work, and in the end find this course cheapest and best. Good business men now seldom employ blacksmiths to tell them what is the matter with their watches, but in this collection of vital statistics the law was made to provide for the collection by supervisors because it was not made plain to the legislators that it required special education, and because the subject was new to them and the expense of their collection by some special officer would not then

have been thought justifiable; and without proper provision for skillful labor on them after collection it might well be questioned if such additional expense was then warranted. Now, however, the case is somewhat different. In the act establishing the State Board of Health provision was made for the selection of an officer by that board whose qualifications should fit him for the duties of compiling and superintending the vital statistics of the State. It is expected that their compilation will be done, or at least superintended, by a person familiar with, and qualified for, the work. If this expectation is realized the material to be compiled should also be made as perfect as possible, in order to get profitable and good results, for it can hardly be considered economy to employ skilled labor upon imperfect materials when, for a slight additional expenditure, good material may be had.

PRINCIPAL DEFECTS IN PRESENT SYSTEM.

The principal causes of defects in the material as now collected are indicated by Dr. Hitchcock in his address, as follows: "The supervisor or assessor may fairly be presumed to be *not a physician,* and with no special qualifications for ascertaining exactly or recording with accuracy of what disease any person may have died several months or a year before. He must take the statement of the family, friends or neighbors; and how much reliance there is to be placed upon the memory of such persons as to the cause of a death that took place months before, any educated physician can understand who knows how his diagnosis of disease is, often at the time of making it, falsified or caricatured by ignorant and forgetful friends and meddling and prejudiced neighbors."

Here are the two principal defects in the present system of collection: 1. It is done by an officer not selected for his fitness for this work, but charged with the performance of other duties requiring great care and judgment of a different kind; 2. It is not done until many months have passed after the occurrence of the births or deaths of which a record is desired. Aside from political influences, the supervisors and assessors are usually selected for their good judgment of the values of different kinds of property, and for other qualifications especially fitting them for what have been considered their main duties. These duties as assessors are important, and should call for their best efforts and undivided attention; but whenever new work has come up which was of any importance and had to be performed in the township, it has been the custom of the Legislature to provide for its being done by the supervisors and assessors; and it has generally happened that it was required to be done "at the time of taking a list of the taxable property,"—just when the mind of the officer was most needed for his regular official duties. This is true of the census statistics, now collected only once in ten years, but other statistics, such as of the deaf, dumb, blind, and insane, are now collected annually. In addition to these other duties, the supervisors and assessors, are now annually required to collect the statistics of births and deaths. Even if they were selected for their fitness for this work, they could not do justice by it, and it would not be good economy to have them undertake to do it all at that time.

A PLAN HERETOFORE PROPOSED.

A few years ago I endeavored to have the law so amended that the work of supervisors in collecting the vital statistics should be lightened. The section providing for this was one section of a long bill, and it did not become a law, I believe for that reason. It was substantially as follows:

"It shall be the duty of every physician, midwife, or other person having

professional charge of a birth or of a person who dies, it shall also be the duty of every householder, of the parents or of the eldest person next of kin residing in this State, within thirty days from the occurrence thereof, to give an accurate notice of every birth or death of a person under their professional care, in their household, or of a member of their family, as the case may be, to the supervisor or assessor of the township, city, or ward in which such birth or death occurred, or within which said physician, householder, parent, or eldest person next of kin resides: *Provided*, That in the city of Detroit said notice shall be given to persons appointed by the common council as provided in section one of this act. Of the above mentioned persons, whoever neglects to give such notice, or to ascertain that it has been given, for the space of three months after a birth or death shall have occurred of a person under their professional care, in their household, or family, as the case may be, shall forfeit a sum not exceeding five dollars. Each supervisor, assessor, or person appointed by the common council of the city of Detroit to act in place of such officer, shall file all such notices received by him, and shall pass over to his successor in office all such notices referring to births or deaths which have not already been returned by him to the county clerk."

By moving for the enactment of the foregoing section, it was intended to improve the collection of these statistics in two ways: 1. By eventually having the greater number of births and deaths recorded before the time of making the assessment, and leaving a much smaller number to be called for at that time. (If the law were entirely obeyed there would be only the very few that had occurred within thirty days, unrecorded at that time.) 2. It was to have the record made directly after the birth or death, instead of as now after several months when, for a large number, it has become impossible to obtain the details. It will be seen that this second named object was the same as the second principal defect previously referred to as mentioned by Dr. Hitchcock, in his address, and with him I still think that it is desirable "to make the statistics of births, as far as possible, take origin with an active interested participant in the event, and require every physician or midwife attending any case of labor to make a record of all the facts desirable to be tabulated with the birth, and report the same" to some suitable and designated person within a limited time. "In cases where no physician or midwife was in attendance, the same duty might be required of the father and mother of the child."

In this connection two questions immediately arise: 1. Shall the person supplying the report receive a fee therefor? 2. To whom shall the report go? To the first question, if the physician furnish the report, I say yes; unless it is expected that physicians shall receive from their patients a fee sufficient to compensate for this service, but if some individual interested in the family, as the father, mother, or person next of kin, be required to supply the facts for record, it seems to me that no fee should be paid them, for they should have an interest in having a proper legal record of the births and deaths which occur in their own family sufficient to compensate them for the trouble involved in placing the facts upon record, especially as the government proposes to keep and maintain such records at the public expense. The second question is also one of importance, and should be well considered. When I was engaged upon the general statistics of this State, it was my belief that they would never be as reliable as they should be until they are collected every year by qualified persons, and a permanent statistical organization made throughout the State for the collection and compilation of those facts which are needed for the use of agriculturists, merchants, manufacturers, and other business men. On page IX. of

the Introduction to the "Statistics of Michigan 1870," I advocated "creating the office of Registrar in each city and township in the State, and this would relieve supervisors and assessors of much work now unpleasant for them to perform, and which is only indifferently accomplished, partly because it is outside of the regular work for which they are elected." "If hereafter a proper officer be selected by the people in each locality with special reference to such work, the labor of enumerating for the United States as well as for the State censuses will no doubt be profitably entrusted to such officers, who will find employment every year in enumerating and returning to some central office the statistics of births and deaths and other important statistics." I still think this would be a very great improvement over the present method, because the officer would be selected for his fitness for collecting statistics, and I do not now see any improvement in the suggestion so far as it relates to the general statistics; but I now think it will be best to have the *vital* statistics not only originate with, but remain in the care of medical men who give special attention to subjects connected with public health. There is very much to be gained by this, and, so far as I can see, no loss. I need not dwell long on the sources of gain, it must be evident that persons specially educated for a given work will do that work better than those that have not that special preparation, but it may be mentioned that it is not infrequently the case now at the State Department that we are able to make out the cause of death when it was entirely unintelligible to the nonprofessional person who copied it at the office of the county clerk, and, in some cases, when it was evidently the same to the supervisor, but having given his rendering of the term he received from a physician, and the same being faithfully copied in the county clerk's office, another physician could easily understand what was the cause of death first stated. There are, however, a very great number of cases in which it is utterly impossible to learn from the returns anything definite about the cause of death, and this is perhaps the most important item of all. If physicians reported to an educated medical officer, this number might be very greatly reduced, and the certainty and value of the statistics at least correspondingly enhanced.

GAIN EFFICIENT ACTION BY LOCAL BOARDS OF HEALTH.

I wish to quote still further from the president's address, as follows: "The more I reflect upon it, the more does it appear to me that in the very general organization of local boards of health, and their proper constitution, are we to find some of our greatest aids, not only in the study of what needs to be done in the line of hygienic improvements, but in practically securing the benefits of these improvements to the people. Ought not this Board to labor even more earnestly than it has to secure the establishment of an efficient Board of Health in every city, village, and township of the State?" * * * "Is it not possible for us to secure the enactment of a law that shall *require* that in every city, village, and township a well educated, efficient physician be made, either by election or appointment, the health officer of the city, village, or township, and as such the executive officer of the local board of health?" * * * "Would it not be well that among other duties he should receive the statistics of births and deaths, and perhaps marriages, and that once in three months he should make his report of these statistics to the county clerk, or directly to the State Board of Health?" In my opinion this Chief Medical officer of Health which should exist in every city, village, and township, is the proper person to take charge of the statistics of births and deaths in such city, village, and township. As regards marriage statistics, I will touch upon that subject further on.

I think this officer should make out his report in duplicate, and send one copy to the clerk of the county, and one copy to the State Department where the statistics are to be compiled. This would place the central office in more direct communication with the original sources of information, and would avoid the errors incidental to having returns copied by nonprofessional persons at the offices of the county clerks. The returns should be upon uniform blanks planned by the Superintendent of vital statistics, and supplied by the State Department, and be so planned that they need not be copied, but bound up by counties as permanent records.

RETURN OF "DISEASES DANGEROUS TO THE PUBLIC HEALTH," WOULD BE BETTER MADE BY THE MEDICAL OFFICER PROPOSED.

The law now provides that "It shall be the duty of the health physician, and also of the clerk of the local board of health in each township, city, and village in this State, at least once in each year, to report to the State Board of Health their proceedings, and such other facts required, on blanks and in accordance with instructions received from said State Board. They shall also make special reports whenever required to do so by the State Board of Health."*

Heretofore it has not been practicable to obtain reports from the "Health Physicians," because the health physicians have not been appointed by many of the local boards of health, consequently all the reports of "diseases dangerous to the public health," etc., have been asked for and obtained, if at all, from the clerks of local boards of health. These officers are not usually physicians, and there is the same difficulty in the collection of the facts relative to infectious and contagious diseases as there is with the collection of the statistics of births and deaths. If the law is made to require that a health physician shall be appointed in every city, village and township, and hold his office until his successor is appointed and legally qualified, it will then be possible to transfer to the health physician from the clerks of townships, cities and villages, acting as clerks of local boards of health, so much of the labor now performed by them as relates to diseases and deaths. It needs no long argument to show that this service will then be likely to be much more satisfactorily performed, and that the cause of public health in this state will be very materially advanced by such transfer.

MARRIAGE STATISTICS.

Under our present marriage laws, several evils exist, some of which may probably be corrected by proper amendment of the laws. One is the solemnization of marriages by ministers and justices of the peace in many cases where the persons married have not yet reached the marriageable age specified in the law. This is a disobedience of law, but it is possible that if the law provided penalties for the solemnization of marriages by ministers and justices except upon certificate of some proper officer stating that a record had been made in his office of the age and such other facts desired, and penalties attached to the issuing of such certificates to persons not of marriageable age, it may be that the number of such marriages can be reduced.

The worst defect, so far as relates to the collection of marriage statistics, is the great number of marriages which are never recorded. Among the reasons for the failure to record, are the following: 1. The law does not provide for marriages being placed upon record by the persons most directly interested,—the persons married,—but requires that the minister or justice of the peace who per-

*Sec. 8, Act No. 81, Laws of 1873.

forms the ceremony, a person who has no special interest in the record, shall not only place the marriage on record, but make a return to, and pay for having it recorded in the office of the county clerk. In consideration of the fact that the law provides that ministers and justices of the peace shall have a monopoly of the business, it may be proper to require of them the performance of certain duties in the interest of the people, and the present law so far as it relates to the record and return by them seems just, but it would seem best not to ask too much of them, and to better distribute the labor so as to include all parties interested. I suggest that the law may be improved by striking out the sentence which requires the person solemnizing marriages to pay twenty-five cents for recording each marriage. The statistics are of sufficient value to the people that the record may be kept at the public expense. The law may also be improved by requiring the man that is married to first place on record with some proper officer the facts in which he is interested and those needed for statistical purposes, the pay of this recording officer being provided for by salary or by fee, and to come from the people in whose interest the statistics are desired; requiring this under penalties both to persons married and ministers or justices performing the ceremony, who must first receive and retain a certificate of such perfected record before pronouncing the person legally married. The record and the returns to the county clerk by the minister or other person solemnizing marriages may remain as now, except the payment of the fee by such person. If the license or certificate be obtained of, and the statistical record kept by this same chief medical officer of health acting as Registrar in each city, village, and township, and if he sends one copy of his return to the county clerk and one copy to the State Department, it will be easy to find and trace out any discrepancies between licenses issued and marriages returned.

A MEDICAL OFFICER OF HEALTH, ESSENTIAL TO PROPER CARE OF THE PUBLIC HEALTH, AND TO BETTER VITAL STATISTICS.

Summarizing the preceding considerations, it seems to me that a Health Physician or Medical Officer of Health is needed in each township, city and village for at least three reasons:

1. To apply and make of practical use the knowledge that we now have. To act as a leader and an executive officer of the local board of health, that the Board of Health shall not as now follow in the rear of public opinion, waiting until the common people complain before taking action, but that the local board of health shall be in advance of those not specially educated in the subject, and be able to detect and remove many causes of sickness and death that now prevail, and of which people not skilled in public hygiene are almost entirely ignorant.

2. Such an officer is needed to increase and make more definite and certain the knowledge which is to serve as an important basis of the hygienic and sanitary work of the future,—to render more exact and more valuable the statistics of births and deaths now collected by supervisors and assessors.

3. Such an officer is needed as an intelligent as well as vigilant sentinel to give due and timely warning of threatened danger to the public health, to keep the record and make the reports of cases of infectious and contagious diseases, —work now being done, where it is done at all, by the clerks of local boards of health.

Perhaps there is a fourth reason why there should be such an officer. It would seem to be best to have the officer who is to record intentions of marriage as near and accessible to the people as possible, and if in each city, village and township, it would be most natural, and most convenient for communication

from the State Department, to have this officer the same one who has charge of the statistics of births and deaths.

THE PEOPLE HAVE DUTIES, AND SHOULD CONTRIBUTE TO THE PUBLIC HEALTH.

With such an officer in every local board of health, there yet remains the fact that it will be difficult for him to collect all the facts desired, except through the provision of further aid. Something must be done by the people themselves. As before suggested, it would seem that their personal interests should prompt them to secure a legal record; and it does seem probable that as fast as they can come to understand the very important uses to be made of vital statistics they will willingly conform to a law providing that they must furnish to the proper officers within a limited time such facts as it is important shall be recorded. In the cities and incorporated villages, at least, I think the law should require that these facts concerning deaths shall be presented to the proper recording officer before burial or removal of the body from the city or village shall be permitted, and that penalties be provided for the violation of this law by sextons or by other persons. This is not an untried experiment, but it is the plan now in force in the city of New York. Only by some such law is it possible to obtain such statistics in the cities of our own State.

From the Lansing Republican of April 20, 1875, I quote as follows: "The American Journal of the Medical Sciences, published at Philadelphia, one of the best authorities in the country, in a review of the Fifth Annual Report of Vital Statistics in Michigan, after speaking of the defects in the present law which make it necessary to add a large per cent. to the births and deaths in order to make them represent the truth, says it believes 'the provision a good one which places registration under the management of the State Board of Health.' * * * 'It is to be regretted that so much care and skill and such immense labor had to be exercised upon returns so very imperfect. Still a remark made by the compiler is perfectly true, that for many purposes and under many aspects partial returns may be almost as valuable as complete ones. Much greater care, however, must be taken to avoid false inferences where such imperfections exist.' The Journal closes its review of this report by saying that 'if the legislators of Michigan do not at once amend their registration laws, they will show themselves culpably indifferent to a most important interest of the State.' * *"

That the Legislature of Michigan will long delay to properly amend these laws is not probable. A State that provided a working system of vital statistics in advance of many much older States,—in advance of even the great State of Pennsylvania, in which the distinguished journal above mentioned is published, a State like Michigan, which stands in the front rank in its legislation for the promotion of public health, should not fail to continue to advance as fast as its trusted laborers in different fields of human progress are well prepared. In the progress of sanitary statistics, as in other affairs, it is probably well to "Prove all things, hold fast that which is good." In order that the views of those supposed to be qualified to judge in this subject may be accessible to the legislators of this State, I respectfully suggest the passage of a resolution appointing a special committee of this Board, charged with the duty of preparing a proper bill which shall embody the views of this Board, the committee to report the bill to this Board for examination at its next meeting, in order that after due consideration a memorial may be sent to the Legislature for the enactment of a law amending the present laws for the collection of vital statistics.

Very respectfully,

HENRY B. BAKER.

VENTILATION OF RAILROAD CARS.

By R. C. KEDZIE,

MEMBER OF THE

STATE BOARD OF HEALTH,

AND

CHAIRMAN OF THE COMMITTEE ON VENTILATION, ETC.

VENTILATION OF RAILROAD CARS.

Almost every person who has had occasion to ride any considerable distance on railroads, especially if there are many passengers, has experienced discomfort from the imperfect ventilation of the cars. This is especially noticeable on entering a car on any of the fast or express trains which make but few stops, and the air consequently is seldom changed by opening of the doors to receive or discharge passengers. The air in such cars is very repulsive; yet the passengers have become so accustomed to breathing the foul air, or are so stupified by its influence, that they make no complaint. But to a person entering the car, passing from the pure out-door air, the stench is intolerable.

Several years ago I rode in a car from Detroit to Ypsilanti. The weather was very cold, and every window was closed. The car was crowded, every seat full, and many passengers stood in the aisle. The air became so foul that the candles "burned blue;" the candle in the rear end of the car was extinguished twice before we reached Ypsilanti, and the candle near the middle of the car went out once in the same distance. When the train stopped and the doors were opened for a few minutes, the candles burned brightly, but when the doors were closed, the candles burned more and more dimly till some of them were extinguished. The candle in the front end of the car burned more freely because a strong wind was blowing from the southwest, and some fresh air was forced into this portion of the car, enough to sustain combustion. This car had the Ruttan ventilation, but the weather being very cold, the valves in fresh-air pipes were closed because no one would endure a blast of air blowing upon them while the temperature of this air was near zero. This is the fatal defect in Ruttan ventilation in cold weather.

I have been requested by several persons to give my attention to this subject of railroad ventilation. Hon. S. S. Cobb, Commissioner of Railroads for this State, has several times called my attention to this subject. "Something must be done to secure ventilation of railroad cars; the air in most of them in cold weather is simply horrible." Urged by such men, and also urged by my desire to do something for the comfort and health of railroad passengers, I have given some attention and thought to this subject, and herewith present the results of such study.

In cars, as elsewhere, ventilation is secured by a constant influx of pure air, and a corresponding efflux of foul air. But in securing this change of air, due regard must be paid to the health and comfort of the passengers. No ventilation is good that subjects the passengers to a draught of cold air. "A blast of cold air may kill like a sword." The evil effects of such cold draughts are

often experienced in cars where the windows can be opened. A friend of mine rode in a car from Chicago to Jackson in cold weather. A lady wrapped in cloak, shawl and furs, sat by an open window through which a strong blast of cold air blew upon the other passengers. After enduring this outrage for some time, she was politely requested to suffer the window to be closed. "I prefer to have it open," said the serene fur-clad lady (?). Thus this selfish thing inflicted 250 miles of misery upon her fellow travellers. Such an outrage would be tolerated nowhere save in an American railroad car, and at the hands of one who called herself a lady! My friend was sick for two weeks in consequence of this exposure, and doubtless others suffered from the same cause.

The problem in ventilating a car is, to introduce a sufficient amount of pure air, which shall penetrate all parts of the car space without seriously disturbing any one by unpleasant and unwholesome draughts, and with as much economy of heat as can be secured. The practice of placing ventilators near the top of the car, by which much of the heated air will escape, without any adequate change of air in the body of the car, is a wasteful and inefficient system of ventilation. Open-window ventilation is open to serious objections because of draughts, and the entrance of dust and cinders. The Ruttan system is objectionable because of draughts, and too small a supply of air, from the fact that no efficient way is provided for the escape of foul air from the floor-level. We cannot force air in any quantity into a closed space, except as we provide for the escape of a corresponding quantity. The Baker system (I believe it is called) of warming cars by hot-water pipes passing beneath each seat, while excellent as a car-heater, is open to the serious objection that no ventilation or change of air is provided, not even the amount of change which is secured with a stove by the escape of the smoke and air through the stove-pipe. It will thus be seen that the ventilation of railroad cars is very imperfect.

In a car as in every closed room, the different strata of air will occupy positions according to their temperature; the warmest and lightest portion will be at the top, and the coldest and heaviest at the floor-level. The air may be chilly to one while sitting, but hot to one standing. Mr. Bush, Superintendent of the Jackson, Lansing & Saginaw Railroad, told me that while he was conductor on a passenger train he had often heard passengers complain of cold, while at the same time he was bathed in perspiration from the excessive heat. The passenger and conductor lived in air of very different temperature, because at different levels.

This waste heat at the top of the car should be utilized to warm the fresh but cold air which is brought in for purposes of ventilation; that is, *fresh air should be introduced at the top of the car, and foul air removed from the bottom of the car.*

One very important favoring condition of car ventilation is the movement of the car through the air, so that relatively to the car a very strong wind is blowing at nearly all times. If the air is calm and the train is moving 25 or 30 miles an hour, the result is the same as if a very strong wind were blowing and the car stationary. It is only in rare instances that the train is moving with the wind and at the same velocity, so that the train is becalmed by its motion. Any one can see that good ventilation is much more easily secured when a strong and steady wind is blowing than in a calm. By means of this strong wind from the motion of the train relatively to the air, a blast may be thrown into a car by a funneled tube with its mouth open *against* the wind; an exhaus-

tion of air from the car may be secured by means of funneled tubes with their mouths opening *with* the wind.

There are two systems by which air may be forced into a car by means of the motion of the car; one by means of a pump, the lever of which is attached to a car wheel so that each revolution of the wheel would cause a stroke of the piston of the pump, throwing a pump-full of air into the car; the other is by means of the inertia of the air from the relative difference in motion of the outside air and of the car. The pump system has been tried at the east, but as it is easily thrown out of working condition, and would introduce but a small amount of air unless the pump was large and cumbrous, it never came into general use.

The second system is much more simple and inexpensive, and is the one by which the problem of car ventilation will finally be solved.

There are two general systems of ventilation: one by forcing an excess of air into a room (the *plenum* plan), the excess of air being left to find its way out of the room by any chance openings; the other, where air is forcibly withdrawn from a room (the *vacuum* plan), where the air is left to find its way into the room by any cracks and openings. Both of these plans of changing the air in a room,—one by creating an artificial excess of air in the room, and the other by creating an artificial deficiency,—have had their several advocates, but they are both open to objection. By combining both systems, viz.: forcing air into a room and at the same time forcibly withdrawing air from the same room, we most effectually secure that rapid change of air which is sought in ventilation, and at the same time avoid the local draughts which are one disagreeable feature of poor ventilation.

In car ventilation it is essential to rapidly change the air by bringing in a large quantity of fresh air and by removing with equal rapidity a corresponding amount of foul air, the exchange of fresh for foul air being effected without creating sensible draughts or seriously disturbing the temperature. Ventilation is much more needed in a car than in an ordinary room, because the cubic space allotted to each passenger is usually much less than in ordinary rooms. To avoid disturbance of the temperature and to economize heat, the fresh air should be introduced at the top of the car, so that the excessively heated air at the top of the car-space may warm the fresh air so that it will be of agreeable temperature before it reaches the passengers. The foul air should be withdrawn from the floor-level, and thus a complete change of air in the car will be secured. The incoming air should never create sensible draughts, because it is a source of discomfort to which passengers will not readily submit, and because it endangers their health.

I present two plans for car ventilation, hoping they may contribute something towards securing fresher and purer air in our railway cars.

FIRST METHOD.

My first plan is a modification of the Ruttan system, and is presented because it would be very easy of application in cars constructed for Ruttan's ventilators. In the middle of the car a vertical tube 15 inches in diameter passes from the deck of the car down to the bottom of the fresh-air box within the car. The upper end of this tube is surmounted by a large revolving funnel, the mouth of which is kept constantly turned to the wind by means of a strong wind-vane attached to the back of the funnel. The lower end of the vertical tube dips lightly into a tank of water at the bottom of the fresh-air box (sunk below the

level of the car floor to prevent any drip within the car). The air is thus brought in contact with water before it enters the car, whereby all dust and cinders are arrested, and the air is moistened before entering the car. In cold weather the air will not take up much moisture, but in hot weather it will take up a sensible amount of water and become more cool and refreshing thereby. From opposite sides of the fresh-air box, near the roof of the car, a tube 12 inches in diameter proceeds to the end of the car, these tubes being so joined to the fresh-air box that they can readily revolve around their long axes. A strip along one side of the tube and embracing one-third of the circumference of the tube is made of perforated tin plate or fine wire gauze, to permit the escape of air in very fine streams. By revolving these long tubes on their axes, the perforated strip may be at the top, side, or bottom, and the air sent in one direction or the other as may best suit the wishes of passengers; in cold weather the perforated strip would be at the top, but in very hot weather it might be at the bottom.

To remove the foul air, the space beneath four seats—two on each side of the car, and about one-third the length of the car from each end—is boxed up for a foul-air box, but opening at the end into the aisle, the opening being covered with a coarse wire screen. From the bottom of each foul-air box a tube eight inches in diameter passes through the floor of the car and terminates (by recurving) in a funnel which opens in the opposite direction to that in which the car is moving. These funnels can revolve so as to always open to the rearward of the car. The rapid motion of the funnels relatively to the outside air, will cause a strong outward draught, and thus rapidly withdraw the foul air from the floor-level of the car.

The sketch, in diagram 1, of a vertical section of one side of a car will enable the reader to comprehend the plan better than any mere description.

By this method of ventilation the air when introduced is free from all dust and cinders, is evenly distributed through the car, and without any sensible draught or discomfort even to the most sensitive, while the foul air is rapidly withdrawn at the same time. The expense of introducing such a system would be very small, nor would it involve any expense after the first introduction.

SECOND METHOD.

In cars not provided with the Ruttan system a very simple and effective means of introducing an abundant supply of fresh air may be provided by utilizing the elevated space at the top of the car immediately over the aisle. The sides of this small second story of the car sometimes contain small ventilating windows, but they are inefficient even when open, and are usually closed when ventilation is most needed. This space can be put to a better use than to display stained glass and ornamental but delusive ventilators. If the main roof of the car is carried from side to side so as to close the bottom of this second story there will be a continuous gallery running the whole length of the car, some two and a half feet wide and about a foot deep. If both ends of this gallery are open to the air, a strong current of air will sweep through it when the car is in motion. If the forward end is open and the other closed, this current of air will enter the top of the car-space by any openings in the floor of this gallery. A large valve placed in each end of the gallery will regulate the amount of air passing, preventing its passage or permitting partial or free passage, according to the position of the valve. In this way the amount of air admitted into the car may be under control.

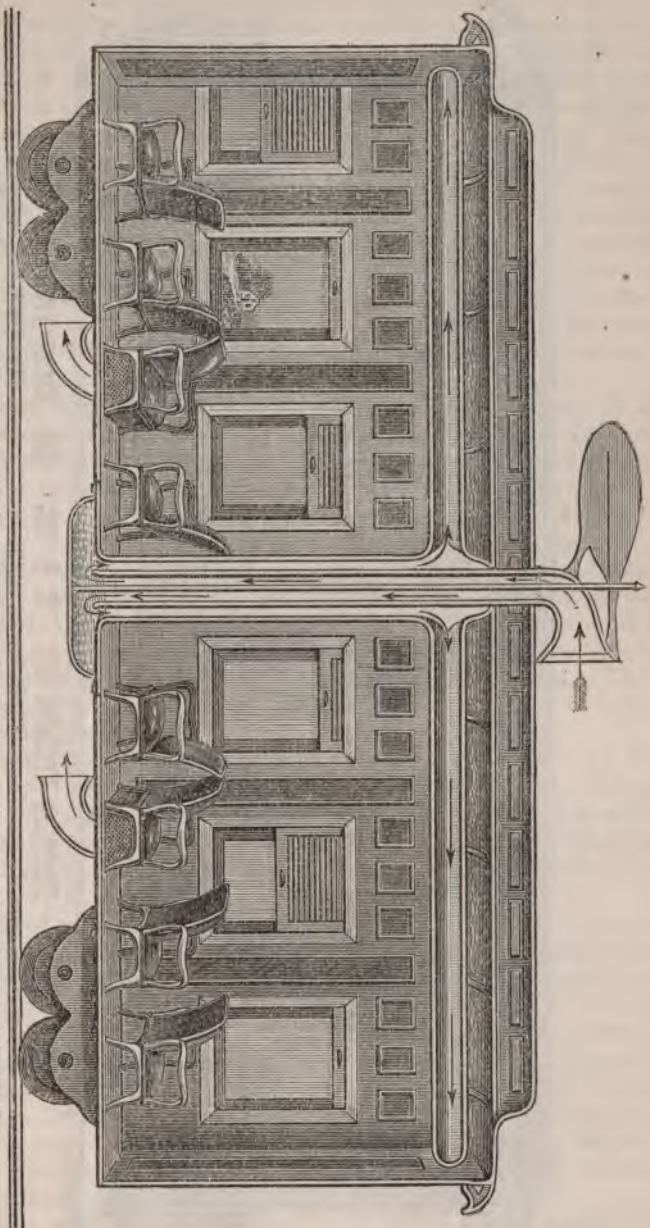


Diagram 1. Illustrating Ventilation of R. R. Car. Car Moving Toward the Right.

Designed by E. C. Eddie. Mich. Eng. Co., Detroit. Drawn by W. S. Holdsworth.

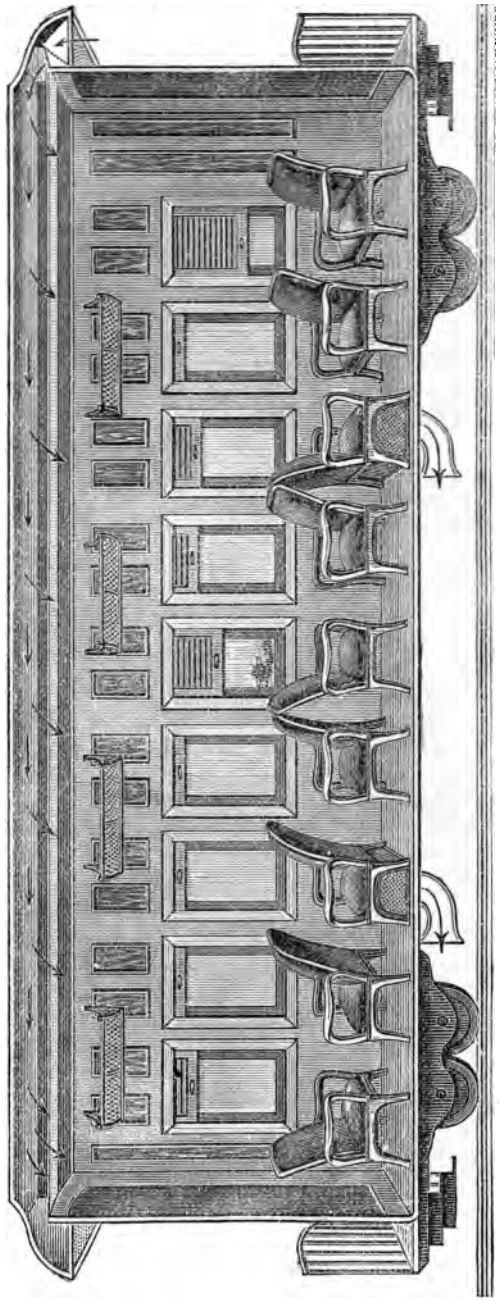


Diagram 2. Illustrating Ventilation of R. R. Car. Car Moving Toward the Right.

Designed by E. C. Ketcle. Mich. Eng. Co., Detroit. Drawn by W. S. Holdsworth.

Smoke and cinders from the locomotive may enter this gallery and be a source of discomfort to the passengers. The entrance of cinders may be prevented for the most part by placing wire screens over the external openings of the gallery. In the Winchell system the external openings are directly at the ends of the gallery, while in the Kirby system the openings are under the hood that covers the platform of the car. In this respect the Kirby system is the better for excluding both cinders and smoke. In both these systems the fresh air is admitted into the car-space by ten circular registers in the floor of the gallery, which may be opened or closed by turning the wheel of the register. The air is thus admitted in an unbroken current, which is an objectionable feature especially in cold weather. I think that far better results can be obtained by *replacing these registers by a strip of perforated tin plate,* one foot wide, and extending the whole length of the gallery. By this means the incoming fresh air is broken up into very minute streams—is *pulverized,* as it were—and so intimately mingled with the warm air at the top of the car that no sensible draught will be possible. The perforated tin plate will also sift out any cinders and dust, and be an additional safeguard against this annoyance.

The manner of ventilating by this second method is illustrated by Diagram 2, which represents a vertical section of the center of the car through its length. The air enters the ventilating gallery through wire screens beneath the hoods that cover the platforms, traverses the gallery and enters the interior of the car through the strip of perforated tin-plate, which runs the whole length of the gallery. The arrows serve to indicate the course of the air. A valve commands the entrance of air through the wire screens in the hood at each end of the car; the valve may be closed, preventing the entrance or exit of air, may be partly open, or wide open, thus regulating the amount of air passing. In the diagram the car is supposed to be rapidly moving to the right; the valve in the forward end is open, and the one at the rear closed. The foul air is withdrawn at the floor level by the foul-air ejectors opening beneath the car the same as in the first method.

This second method of ventilating a car is a modification of the Kirby system, differing from it in the larger size of the fresh air gallery, the method of admitting the fresh air into the interior of the car, and providing an adequate means of removing the foul air. I consider the improvements important, and essential to the successful working of the Kirby system, especially in very cold weather.

The methods of car-ventilation which I have recommended will act satisfactorily only when the car is in motion, and will cease to act when the car stops. It is difficult to devise any system of ventilation which will act equally well when the car is at rest and when it is in rapid motion, unless we resort to mechanical propulsion of the air. This last method would be so expensive that I have no hopes to see such a system adopted by any board of railroad directors.

Any system of car-ventilation, to work satisfactorily, must be under the exclusive control of the conductor and brakeman. The opening of the car windows at the whim of every passenger will entirely disturb the best system of ventilation, besides admitting cinders and dust. In cars, as elsewhere, this truth remains, that "one sinner destroyeth much good."

A modification of the second method would afford a third method of ventilation, as follows: the fresh air gallery is divided at its center by a vertical diaphragm passing across from side to side, impervious to air, and thus dividing the gallery into two galleries, each, half the length of the car. By leaving the

valves at both ends open, air will enter by the forward half of the gallery, and leave the car by the posterior half. By this means the air will be constantly changed; but the mass of the air in the car will not be as effectually changed as it is where the air is withdrawn at the floor level. It will not economize the heat as well as in the other methods, but will obviate the use of the foul-air ejectors in the floor as recommended in the first and second methods. It would answer very well for warm weather, but would not be as satisfactory in cold weather.

AGRICULTURAL COLLEGE, June 22, 1876.

RELATIVE TO THE

DISEASES IN MICHIGAN DURING THE YEAR 1875;

INCLUDING REPLIES OF

CORRESPONDENTS OF THE STATE BOARD OF HEALTH,

To Circular No. 11, Issued by the Board.

ARRANGED FOR PUBLICATION

BY THE SECRETARY OF THE BOARD.

DISEASES IN MICHIGAN DURING THE YEAR 1875.

This is an attempt to commence the important work of placing upon record the facts relative to the prevalence or absence of the prominent diseases that afflict humanity, with a view of eventually learning the conditions which exist during periods of time particularly noticeable either for the prevalence or absence of each of the important diseases. It is also an attempt to secure a record of the diseases of domestic animals and of food-crops used by men and animals, and of other important conditions supposed to be capable of affecting the health of the people; all of which have never before, in this State, been systematically placed upon record.

One object in view in securing these statements was to have them on record so that they could be studied in connection with the records of deaths now being collected by the supervisors and assessors, and with meteorological conditions which are being observed and registered by quite a number of meteorological observers for this Board in this State.

Although this volume is the Annual Report for the fiscal year ending September 30, 1876, it should be noticed that the following statements relate to the diseases in Michigan during the calendar year ending December 31, 1875. The law in this State requires Reports of all State Boards to be for the fiscal year, and to be made out as soon after its close—September 30—as is practicable. Inasmuch as these statements are for a year ending later than that, and as regards the latter part of the year, were necessarily made after the year had closed, they could not well be included in the previous Report of this Board.

Considerable care has been exercised in arranging some of the replies, but notwithstanding this it is possible that in some cases, material may have been included that was not written with a view of publication; and many of the writers seem to think that much better reports can be made in future.

Replies have been received, and are here published, from 29 correspondents, 28 of whom have submitted statements more or less definite and complete, based upon the best information accessible to them, in some cases being estimates and opinions, but formed by those having the best opportunities for judging correctly, while in some cases the facts were known and stated. As the system is continued, the observers will each year become more and more prepared to lessen the number of cases requiring estimates, and to increase the number of statements of facts.

The replies are for 26 different localities in as many different parts of the

State; none, however, were received from the Upper Peninsula. So far as these replies represent the facts for this State, it will be seen that during the year 1875 there was very much less sickness and a smaller death-rate than in previous years.

The replies of the twenty-nine correspondents may be summarized as follows: One lives in a large city, where the facts are as yet difficult to obtain, and could not secure data satisfactory to himself. To some of the several questions, twenty-eight reply as follows: *

1. To the question as to relative proportion of sickness during the year 1875 from all causes, only one says it was greater; in his locality he thinks it was thirty-three per cent. greater. Only one says it was equal, while twenty-six say it was less than the average of previous years. Of this twenty-six, nineteen say how much less sickness they think there was, the average of the nineteen statements being thirty-two per cent. If we include the one where it was the same as heretofore and the one where it was thirty-three per cent. greater, the average of the twenty-one statements would be twenty-seven per cent. less than the average. Probably this would have been still further reduced if the other seven observers had stated the per cent. of decrease; but the fact remains that twenty-six out of twenty-eight correspondents reported that the sickness during the year 1875 was less than heretofore.

2. The death-rate also was less in 1875 than formerly, but does not appear to have been lessened so much as was the sickness. Only one reports the death-rate greater than formerly, by twelve per cent., seven report it the same as heretofore, while twenty report that it was less, in their localities. Of the twenty, thirteen state the proportion of reduction, the average being thirty per cent. Including the one where it was twelve per cent. greater, and the seven where it was the same as heretofore, the average reduction would appear to be eighteen per cent. This might also be modified if the seven who reported the death-rate less had said how much less.

When the returns of deaths by supervisors and assessors come in and are compiled, it will be interesting to compare the results from the two sources. There are causes of inaccuracy in both sources of information, but from either source, some things can be learned of use to humanity, and the subject of these inquiries is one most closely connected with the welfare of the people. If the death-rate in 1875 was less than previously by even ten per cent., it means that, in this State, more than one thousand of our fellow beings, young and old, were left among us who, under the usual death-rate, would have been counted among the dead. If the sickness was decreased only in a corresponding degree, it means a lessening of expenses among the people for sickness, burial of the dead, etc., which would probably amount to over a million of dollars in the single year.

3. In reply to question 3, twelve of the twenty-eight correspondents report that no disease was more than usually prevalent in their localities. Scarlet fever was reported more than usually prevalent by 5 correspondents; measles, by 5; diphtheria, by 3; consumption, by 3; whooping cough, by 2; and cerebro-spinal meningitis, puerperal convulsions, puerperal peritonitis, erysipelas, albuminuria, typho-malarial fever, pneumonia, broncho-pneumonia, and "lung trouble," were each reported more than usually prevalent by one correspondent.

4. In reply to question 4, one of the 28 correspondents "cannot say;" two

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages immediately following this summary.

report that all, and one that nearly all diseases and causes of death were less than usually prevalent in 1875; while two report that no diseases or causes of death were less than usually prevalent. "Malarial diseases" were reported less than usually prevalent by eight correspondents; "miasmatic diseases," by one; "all autumnal fevers," by one; "fevers," by one; "typhoid fever," by five; "typho-malarial fever," by one; "zymotic diseases," by two; "pneumonia," by one; "scarlet fever," by four; "measles," by three; "exanthematous fevers," by one; "contagious diseases," by one; "diphtheria," by one; "whooping cough," by one; "cerebro-spinal meningitis," by one; "cholera morbus," by one; "cholera infantum," by two; "infantile diarrhea," by one; "diseases of digestive organs of children," by one; "summer complaints among children," by one; "dysentery," by two; "diarrhea," by one; "bowel diseases," by one; "inflammation of bowels," by one; "inflammations," by one; and "all diseases except pneumonia, and broncho-pneumonia in children," by one correspondent.

5. Twenty-five correspondents replied to question 5. Of these, fourteen report that from no disease or cause was there more than the usual mortality during the year 1875. "Consumption" is reported by four correspondents to have caused more deaths in 1875 than usual; "scarlet fever," by three; "measles," by two; "diphtheria," by three; "whooping cough," "cerebro-spinal meningitis," "typho-malarial fever," "typhoid fever," "cancer," and "acute albuminuria," each by one correspondent.

6. Twenty-two correspondents replied definitely to question 6. Of these, six correspondents reported less than the usual mortality, in their localities, from "scarlet fever;" five reported less from "typhoid fever;" five from "malarial fever;" two from "typho-malarial fever;" two from "cerebro-spinal meningitis;" three from "measles;" three from "rheumatism;" two from "inflammations;" two from "summer complaint;" three from "dysentery;" three from "cholera infantum;" two from "diarrhea;" two from "peritonitis;" three from "pneumonia;" less than the usual mortality was reported by one, each, from the following: "Diphtheria," "contagious diseases," "erysipelas," "croup," "pulmonary," "continuous fever," "malignant types of fever," "all autumnal fevers," "no diseases," "nearly all diseases," and one reported "nothing unusual."

7. The replies to question 7 are not as complete as desired, but nevertheless some facts and opinions of value are included therein:

Small-pox.—On this point five of the twenty-nine correspondents do not reply. Of the twenty-four others, seventeen report that no cases occurred in their localities. Three correspondents report just one case in each locality, and the other four report, respectively, as follows: Eight cases, three cases, two cases, and "very limited." The fact that although one or more cases occurred in six different localities, the spread of the disease was in each case limited to a few cases, is certainly a gratifying exhibit of the power and influence of public health measures in this State, so far as relates to that one loathsome disease.

Cholera.—To this part of question 7, six correspondents did not reply. Of the twenty-three others, twenty-one report that no case occurred in their localities. One reports "one case," one, "several cases of cholera morbus, which in a cholera season would have been designated as 'Asiatic cholera;'" and one, "a few of cholera infantum." True cholera was the disease inquired about. It

will be seen that one correspondent reports one case, possibly through a misunderstanding of the question.

Scarlet Fever.—To this important item in question 7, only nineteen correspondents gave a reply; one reported that no cases occurred; three reported "a few cases;" three reported the disease "quite prevalent;" and twelve correspondents stated definitely the number of cases that probably occurred in their several localities,—these numbers ranging from one to 133 cases. In this State the subject of small-pox, or cholera, dwindles into insignificance when compared with scarlet fever. Eighteen out of nineteen of the correspondents reported this dangerous disease in their several localities. The disease proves fatal to hundreds in this State every year, and yet the people are not aroused to the importance of prompt, vigorous and persistent action for the restriction of this contagious disease which so greatly impairs the public health.

Typhoid Fever.—Only sixteen correspondents replied; two reported that no case occurred; four reported "a few cases;" and ten stated the actual or probable number of cases for each locality,—ranging from two to fifty cases. Fourteen of the sixteen correspondents reported cases of this disease—another disease which should be greatly reduced in frequency through proper preventive measures.

Measles.—Twenty correspondents replied; four reported that no cases occurred; three reported "a few cases;" seven that it was quite prevalent; and five stated the actual or probable number of cases, ranging from one to two hundred and fifty cases. One correspondent reported "many cases of German measles,—Rötheln."

Whooping-Cough.—Eighteen replies were received; four report "no cases;" six report "a few cases;" five, that "it prevailed extensively;" and three state the number of cases,—two, two, and twelve cases respectively.

Cerebro-Spinal Meningitis.—Twenty-two replies: Ten, that "no cases occurred;" three report "a few cases;" eight state the number of cases respectively,—nine, six, five, three, three, two, two, one; and one correspondent reports four deaths, but does not state the number of cases.

Diphtheria.—Eighteen correspondents replied: Four, that no cases occurred; four, that there were "a few cases;" one, that they were "quite numerous;" and nine state the number of cases,—ranging from three to fifty-six cases.

8. Twenty-six correspondents replied: Cholera was stated by 24 not to have been represented by a single case; small-pox, reported absent by 19; cerebro-spinal meningitis, by 12; typhoid fever, by 5; whooping-cough, by 5; diphtheria, by 5; measles, by 5; scarlet fever, by only 2; while one states his belief that cases of all the contagious and infectious diseases named in question 7 have occurred in his locality, and one says "none," which is interpreted to mean that he cannot name one of those diseases that it was known did not appear in 1875.

9. If it were possible to obtain from each and every correspondent definite statements of facts in reply to question 9, the information would be of very great importance, because it would render it possible to compare the sickness from each and every prevailing disease in each month in each locality with the same in the other localities, and with the meteorological and other conditions found to have prevailed during those months. While it is to be regretted that no better replies were received to question 9, for the year 1875, the reason is very

plain, and the cause is one that can and probably will be gradually overcome in the future. Such questions never before having been asked, the correspondents were not prepared to give definite replies. Hereafter they will be better prepared, and if the inquiries are continued and gradually made more definite and complete, the information supplied will undoubtedly bear a proper relation to the demand therefor.

Ultimately it is desirable to have for each year a consolidated or general statement for the entire State; and although it might not otherwise pay for the trouble this first time, in order to have the work of compilation begin, and keep pace with the improvements in the returns, the replies to question 9 are here tabulated. It is hoped that the tabulation also may be improved hereafter. As here tabulated, the relative number of cases of the several diseases in each locality represented, is not indicated. As a matter of fact it was not often definitely indicated by the correspondents. Only thirteen correspondents attempted to reply, and a still smaller number gave full statements for all the months. The table following includes in each column the names of the diseases reported by the correspondents as prevalent in their localities during the month specified at the top of the column. The figures at the right of each disease indicate the number of correspondents that reported that disease as prevalent in that month. The diseases are arranged in the order of number reporting them, those reported by the greatest number, first. As several diseases were frequently reported by the same number, it has not seemed possible to secure from the data supplied a *complete* idea of the relative extent of distribution of the several diseases in each of the months of the year 1875, though it is hoped the table may have some value in that direction. It will be seen that, as a rule, the names of the diseases are printed as reported, and this results in having in the same column "intermittent fever," "malarial fever," "bilious fever," etc., and "diarrhea," "bowel disease," "bowel trouble," etc. The tabulation can probably be improved hereafter, and it is expected that more specific replies may be secured. Such terms as "bowel diseases" are not quite definite enough to enable one to study the conditions coincident with either diarrhea or dysentery. Such general terms as "lung diseases" are altogether too general to be of much service in this connection. Again the term "Malarial diseases," involves an idea of cause, but what "malaria" is, remains to be demonstrated. If each particular type of disease can be named, there will be a greater prospect of learning the real cause or causes. The tabular exhibit of the replies to question 9 is as follows:

Diseases Prevalent in Michigan in each Month of the Year 1875.—Summary of the Replies to Question 9, Circular [11], by a few Correspondents of the Board.

Order.	January.		February.		March.		April.		May.		June.	
	Disease.	Correspondents reporting cases of.	Disease.	Correspondents reporting cases of.	Disease.	Correspondents reporting cases of.	Disease.	Correspondents reporting cases of.	Disease.	Correspondents reporting cases of.	Disease.	Correspondents reporting cases of.
1	Pneumonia	7	Rheumatism	4	Scarlet fever	5	Intermittent fever	4	Intermittent fever	4	Intermittent fever	4
2	Rheumatism	4	Pneumonia	4	Pneumonia	4	Scarlet fever	3	Scarlet fever	2	Scarlet fever	1
3	Scarlet fever	3	Scarlet fever	3	Rheumatic fever	3	Pneumonia	3	Pneumonia	2	Measles	1
4	Typhoid pneumonia	2	Diphtheria	3	Diphtheria	3	Rheumatism	2	Measles	1	Whooping-cough	1
5	Pleuritis	2	Erysipelas	3	Measles	3	Measles	2	Eruptive diseases	1	Bronchitis	1
6	Diphtheria	2	Peritonitis	2	Bronchitis	2	Consumption	2	Remittent fever	1	Diarrhea	1
7	Remittent fever	2	Measles	2	Rheumatism	2	Bronchitis	1	Whooping-cough	1	Catarrh	1
8	Broncho-pneumon.	1	Remittent fever	2	Remittent fever	2	Pleuritis	1	Influenza	1	Erysipelas	1
9	Bronchitis	1	Malarial fever	2	Malarial fever	1	Remittent Fever	1	Mumps	1	Bilious intermittent	1
10	Lung disease	1	Intermittent fever	1	Intermittent fever	1	Eruptive diseases	1	Erysipelas	1	Remittent fever	1
11	Catarrhal disease	1	Typho-mala. fever	1	Typhoid pneumonia	1	Mumps	1	Canker mouth	1		
12	Typho-mala. fever	1	Typhoid pneumonia	1	Broncho-pneumonia	1	Diphtheria	1				
13	Pernicious fever	1	Broncho-pneumonia	1	Pleuritis	1						
14	Intermittent fever	1	Pleuro-pneumonia	1	Consumption	1						
15	Malarial fever	1	Lung disease	1	Eruptive diseases	1						
16	Throat disease	1	Bronchitis	1	Chicken-pox	1						
17	Mumps	1	Pleuritis	1	Whooping-cough	1						
18	Neuralgia	1	Consumption	1	Mumps	1						
19	Erysipelas	1	Throat disease	1								
20	Peritonitis	1	Mumps	1								
21	Measles	1										

Order.	July.		August.		September.		October.		November.		December.	
	Disease.	Correspondents reporting cases of.	Disease.	Correspondents reporting cases of.	Disease.	Correspondents reporting cases of.	Disease.	Correspondents reporting cases of.	Disease.	Correspondents reporting cases of.	Disease.	Correspondents reporting cases of.
1	Intermittent fever	4	Intermittent fever	4	Dysentery	5	Dysentery	4	Measles	4	Scarlet fever	3
2	Remittent fever	3	Remittent fever	3	Typho-mala. fever	3	Remittent fever	4	Scarlet fever	3	Pneumonia	3
3	Diarrhea	2	Dysentery	3	Diarrhea	2	Typho-mala. fever	4	Pneumonia	3	Measles	2
4	Erysipelas	2	Diarrhea	2	Remittent fever	2	Typhoid fever	3	Remittent fever	3	Bronchitis	2
5	Scarlet fever	1	Typho-mala. fever	2	Bilious remittent	2	Measles	3	Cerebro-Spinal men.	3	Whooping-cough	2
6	Measles	1	Measles	2	Malarial fever	2	Intermittent fever	2	Typho-malarial	2	Croup	1
7	Bowel troubles	1	Bilious intermittent	1	Intermittent fever	2	Diarrhea	1	Intermittent fever	2	Diphtheria	1
8	Typhoid fever	1	Malarial diseases	1	Typhoid fever	2	Cholera infantum	1	Whooping-cough	2	Catarrh	1
9	Bilious intermit.	1	Bilious fever	1	Measles	2	Malarial fevers	1	Malarial diseases	1	Intermittents	1
10	Malarial diseases	1	Typhoid fever	1	Bilious intermittent	1	Bilious fever	1	Diarrhea	1	Typho-mala. fever	1
11	Rheumatism	1	Neuralgia	1	Bilious fever	1	Scarlet fever	1	Neuralgia	1	Neuralgia	1
12	Diphtheria	1	Rheumatic fever	1	Scarlet fever	1	Erysipelas	1	Bronchitis	1	Rheumatism	1
13			Scarlet fever	1	Diphtheria	1	Puer. Peritonitis	1	Rheumatic fever	1	Inflam. serous mem.	1
14			Pneumonia	1			Diphtheria	1	Erysipelas	1		
15			Quinsy	1			Whooping-cough	1	Puer. peritonitis	1		
16			Erysipelas	1			Pneumonia	1	Puerperal fever	1		
17												
18												
19												
20												
21												

13.—Twenty-two correspondents replied to question 13. In some instances the species of animals diseased are not definitely stated; but it seems probable that where "epidemic influenza," and "epizoötic" are reported, the animals affected were horses. Three correspondents reported "epizoötic extensively among horses;" three, reported it "mildly among horses;" one, "influenza among horses;" one, reported "epizoötic among horses in spring;" one, "epizoötic among horses in January and December;" one, "epizoötic generally among horses late in fall;" one, "epizoötic among horses late in fall;" one, "epizoötic among horses in winter;" two, "epidemic influenza;" one, "influenza spring and fall;" one, "epizoötic in October, lightly, few deaths;" two, "epizoötic lightly;" one, "epizoötic, few deaths;" one, "ague among cows;" one, "hog cholera, limited;" one, "hog cholera, general and fatal in fall;" one, "blind staggers among hogs;" and three report "no diseases among animals."

14.—Twenty-one correspondents replied to question 14. Nine reported that no disease prevailed among the crops; five reported "rust in wheat;" one, "smut in cereals;" one, "smut in corn;" one, "none, except corn;" one, "hay mouldy;" one, "grass somewhat mouldy;" one, "grasses injured by frost;" one, "blasted fruit;" one, "rot in apples;" one, "dry rot in potatoes;" two, "potatoes rotted."

15.—Twenty-five correspondents replied to question 15. There were really two questions opposite this number,—one as to actual condition of wheat and other grains, and one relative to fungi affecting any kind of grain. Possibly some correspondents overlooked the first division of the subject. Five simply reported "no fungus;" one, "fungi about as usual;" one, "corn mouldy;" and one correspondent each as follows: "Corn unripe and bad;" "corn and buckwheat not ripe before frost;" "corn soft, frosted, and mouldy;" "good, except corn affected by fungus;" "good, except corn unripe;" "good, except corn unripe and injured by mould;" "good, except corn and potatoes injured by frost;" "oats good, wheat mouldy, corn unripe;" "oats good, wheat excellent, corn affected with smut, and with mould after cutting;" "good, except corn injured by frost, very little fungus;" "good, except soft corn, and wheat somewhat affected by wet and mould, no [other] fungus;" "cereals and hay injured by moisture in harvesting;" "most grains affected with fungi;" "wheat a little grown, no fungus;" "no fungus, [except] potatoes somewhat affected with rot;" "shrunk wheat prevalent;" "good, no fungus;" "wheat never better."

16.—To this question, twenty-five correspondents replied. Fourteen replied "yes;" six, "no;" one, "considerable wet wheat;" one, "no, often musty;" one, "yes, with few exceptions;" one, "yes, with considerable exceptions;" one, "early it was damp, later it was dry."

Relative to questions 16 and 17, it may be remarked that Mr. Benjamin Hart, of Lansing, a gentleman who for a number of years has had much experience with wheat and with flouring mills, says that when wheat is threshed before it has parted with its surplus moisture, it is liable to "bank" in the bin, because each berry is coated with a velvety mould or fungus. It is his opinion that flour made from such wheat is likely to be unwholesome, particularly if the wheat is not submitted to some scouring process before it is ground. On the other hand, if wheat is allowed to get thoroughly dry before its protecting cover of chaff is removed, any minute fungus that forms on the outside is all removed in threshing, and the berry comes out bright and clean, and the wheat does not "bank" in the bin.

17.—To this question twenty-one replied. Four correspondents say "more;" five say "less;" two, "about as usual;" seven replied "no," which would also imply about the same as the average; one says "the first brought in did, that brought in later did not 'bank' in the bin;" while two replied "yes," which is equivalent to no reply.

18.—To this question, twenty-three replied. Fourteen say "less;" three say "more;" four say "about as usual;" and two say "no;" which seems to mean the same as the average.

19.—To this question, only nine attempt to reply. Two give quite complete tabular statements, for which the reader is referred to replies by John Bell, M. D., of Benton Harbor, and Rev. L. M. S. Smith, of Grand Haven. In the last paragraph of the report by Dr. R. F. Strattan, mention is made of the severe cold weather in January and February, and of the particular diseases due to exposure thereto. The other seven correspondents report respectively, about as follows:

"Early part of year cold; spring, backward; one foot of snow May 1; heavy rains in May and June; summer cool, rain-fall moderate, August rainy; late and cold fall; winter mild." "Cool and moist year." "Cool and more rain." "Less sunshine, greater rain-fall in summer than usual." "Remarkably cool." "Winter months extremely cold; first half of summer warm and dry; August and September cool and wet; up to January, 1876, open weather." "February and March intensely cold and stormy; winter protracted into May; summer cool, a few hot days; September cold and rainy with frost; December mild."

20.—In response to this request, communications were received from several of the correspondents, and may be briefly mentioned as follows:

Four members of a family had typhoid fever after using water impregnated with matter from a neighboring privy.—See reply by W. H. Burr, M. D., of Bay City.

Cases of scarlet fever occurred in a family that in the spring of the year moved into a house that had been empty all winter, but in which cases of the disease had been the preceding fall or early winter; also, scarlet fever was, apparently, conveyed by a book.—See reply by E. P. Christian, M. D., of Wyandotte.

Scarlet fever, apparently a "spontaneous" case, but may have been communicated by some article of merchandise. Diphtheria in four members of a family, perhaps communicated by a young man who came down with the disease about two weeks after coming home from a place where the disease was prevalent.—See reply by John P. Stoddard, M. D., of Albion.

Five cases of typhoid fever in a family living in a house adjacent to gas works and the railroad, the main floor of the house being several feet below the street, and the soil mucky; the water was obtained through log pipes.—See reply by Arthur Hazlewood, M. D., of Grand Rapids.

A case of slow poisoning by arsenical wall paper. Sawdust as a generator of malaria.—See reply by O. E. Herrick, M. D., of Greenville.

Diphtheria prevalent in same locality for a considerable time.—See reply by H. C. Clapp, M. D., of Mendon.

Decreased sickness attributed to effects of previous thorough drainage of locality.—See reply by J. Andrews, M. D., of Paw Paw.

Suggestion for prevention of deaths, by legislation, requiring certain qualifications of all who are allowed to practice medicine.—See reply by C. M. Woodward, M. D., of Tecumseh.

Slow poisoning of people in cold weather, because of imperfect ventilation, especially in public schools, public halls, etc.—See reply by G. E. Corbin, M. D., of St. Johns.

Diseases of the air passages and lungs, due to exposure to cold.—See last paragraph of communication by R. F. Strattan, M. D., of St. Joseph.

Prevention of diseases and deaths might be accomplished by active local boards of health,—suggestion that the law be so amended as to require such boards to organize and appoint a health officer. Sickness possibly due to location of village on east side of stream having decaying vegetable matter along the banks, the prevailing winds being from the west.—See reply by H. W. Browne, M. D., of Hubbardston.

In connection with this subject of the diseases prevailing in Michigan during the year 1875, it may be mentioned that considerable data bearing upon the subject is on file in the office of the Board, in the form of special and annual reports of the clerks of local boards of health. It has several times been examined with a view to its compilation and publication; but there are as yet several difficulties in the way of doing this in a satisfactory manner. In the meantime, the material may be consulted in manuscript, in aid of any special study connected with the work of the Board.

The circular asking for these reports of the regular correspondents of the Board, was planned during the latter part of the year, and issued in December, 1875. It was as follows:

[11.] CIRCULAR TO CORRESPONDENTS RELATIVE TO PREVAILING DISEASES.

OFFICE OF THE STATE BOARD OF HEALTH,
LANSING, MICHIGAN, DECEMBER, 1875.

To the Correspondents of the State Board of Health:

GENTLEMEN:—This Board desires to have, and to place upon record for purposes of future study in connection with records of deaths and of meteorological conditions, statements, for as many different localities in the State as possible, of the diseases prevailing during the year 1875. Will you have the kindness to send, as soon after December 31, 1875, as is convenient, to the office of this Board at Lansing, your replies to the following questions? Please use the stamped envelope enclosed herewith, and leave all additional postage to be paid at this office. In replying it will not be necessary to repeat the questions, but simply to refer to the Circular and to each question by number. Please define the locality for which your replies are made.

1. Among the people of your locality, and considering the increase or decrease of population, was the proportion of sickness from all causes during the year ending Dec. 31, 1875, greater, less, or about the same as the average during previous years? If not the same, how much was it increased or diminished?
2. Compared with previous years, and from all causes, was the proportion of deaths to inhabitants during the year 1875, greater, less, or about the same as the average? If not the same, how much was it increased or diminished?
3. What diseases, or causes of death, have been more than usually prevalent during the year 1875?
4. What diseases, or causes of death, have been less than usually prevalent?
5. From what diseases or causes has there been more than the usual mortality during the year 1875?
6. From what diseases or causes has there been less than the usual mortality?
7. State number of cases of small-pox, cholera, scarlet fever, typhoid fever, measles, whooping-cough, cerebro-spinal meningitis, diphtheria, and of any epidemic,

endemic, contagious or infectious disease that has appeared. (Facts are especially desired, but opinions are better than no statements, though it will be well to state them as opinions.)

8. Of such diseases, name those of which no case has appeared during the year 1875.
9. Please give a summary statement of the diseases which have prevailed in each month of the year 1875.
10. Please mention dates of the occurrence of any disease not usually occurring in your locality, and of any attended with an unusually high or low rate of mortality.
11. What diseases are prevailing at the time you send this statement?
12. Are any diseases now especially or unusually prevalent or fatal? If so, what diseases and to what extent?
13. What diseases have prevailed, and to what extent among animals?
14. What diseases have prevailed, and to what extent, among the crops, as of potatoes, hops, fruits, and especially cereals and grasses, whether affected by rust, smut, "bunt," mildew, or mould?
15. As regards rye, oats, corn, buckwheat, and other grains, wheat in particular, it is desired to ascertain the actual condition when ready for market or use. Were any of these affected by any kind of fungus?
16. Was the wheat generally allowed to get thoroughly dry before it was threshed?
17. Do the wheat buyers or millers say that wheat this year is more or less than usually liable to "bank" in the bin?
18. Was the hay crop, secured during the past season, more or less than usually affected by mildew or mould?
19. Please give a summary statement of the meteorological conditions during the year 1875, specifying, if possible, the general characters for each month, and noting any peculiar or unusual conditions,
20. Please communicate facts bearing upon, or cases illustrating the causation or communicability of diseases.

Any suggestions which you may feel inclined to make, concerning methods which seem practicable, for the prevention of sickness or deaths from removable causes, in your locality, or in this State, need not be withheld.

As stated parenthetically after question 7, in the absence of positive knowledge, opinions are desired. The fact that it will be difficult, and sometimes impossible to give the information asked for is well understood, but the importance of the subject warrants the effort which it is believed will not always be barren of results, but will tend to accumulate data which will eventually be of great value to the people.

By direction of the State Board of Health.

Very respectfully,

HENRY B. BAKER, *Secretary.*

All replies received up to time of printing, here follow in the order in which they were received.

REPLIES BY CORRESPONDENTS.

REPLIES BY J. J. MULHERON, M. D., OF DETROIT, MICH.

Secretary State Board of Health:

DEAR SIR:—Inclosed please find a few answers to questions contained in Circular relative to prevailing diseases. I have kept no record of them during the year and these answers make no pretensions to exactness. I feel that an apology is necessary for sending them. I contemplate during the coming year preparing for the *Penin-*

sular Journal monthly reports of the mortality and of the prevailing diseases, and will, I trust, be better prepared a year hence to answer the important questions you have submitted.*

1. The sickness in the city was less during '75 than during the previous year. How much less, however, I cannot state.

2. The proportion of deaths was, I should judge from mortality reports published, about the same as the average. The number of deaths I think was out of proportion to the amount of sickness, there having been an unusual number of comparatively sudden deaths among adults and the aged.

3. Scarlatina and measles are at present unusually prevalent. The mortality, however, is low.

4. Summer complaints among children.

5. None.

6. Summer complaints of children.

7. The facts are not conveniently accessible. Small-pox has prevailed to a very limited degree; I have knowledge of only two cases. Cholera—none. Scarlatina since October, has been quite prevalent; the number of cases I cannot state. Typhoid fever,—comparatively, a very few cases. Measles, unusually prevalent; have seen over 50 cases in my own practice since October. Whooping-cough, a very few cases. Cerebro-spinal meningitis, none to my knowledge.

8. Cholera and cerebro-spinal meningitis.

9. Scarlatina and measles,—type mild, very few deaths.

Respectfully yours,

Detroit, Mich., Dec. 17, 1875. J. J. MULHERON.

REPLIES BY W. H. BURR, M. D., OF BAY CITY, MICH.

To the State Board of Health:

GENTLEMEN:—As your correspondent at this point, I herewith submit my report for the year 1875, in compliance with Circular 11 issued by you. In compiling this report I regret that the lack of sufficient data, and my inability to obtain reports from some of our physicians, make it somewhat incomplete, but I believe it to be as full and accurate as the circumstances will admit of. I have endeavored by investigation and careful inquiry to answer these questions intelligently, and in the case of most of them am able to do so. A portion of them, however, I cannot give facts upon satisfactorily to myself, or as I might have done had my observations extended over a greater period of time. This report embraces the territory contained within the corporate limits of Bay City,—a city of some 15,000 inhabitants, and the climate is a malarious one,—a fact which probably accounts for the comparative absence of epidemic and other serious affections. Following is a response to your several questions *seriatim*.*

1. The proportion of sickness in this locality for the past year [1875] was less than the average during previous years. But how *much* less I am unable to state.

2. The proportion of deaths to inhabitants from all causes, was less than the average of previous years.

3. There have been no diseases or causes of death more than usually prevalent.

4. The diseases less than usually prevalent were typho-malarial fevers, inflammations, and contagious diseases.

5. None.

6. Typho-malarial fevers, inflammations and contagious diseases.

7. The number of cases of contagious and infectious diseases, and deaths therefrom, that have occurred during the year, is as follows: Scarlet fever 124, deaths 16, typhoid fever 9, deaths 1, cerebro-spinal meningitis 6, deaths 2, diphtheria 56, deaths 8, whooping-cough and measles have prevailed extensively, but as physicians do not keep any record of such cases, and as many never come under the notice of medical men, I could give nothing but approximative results. During the prevalence of the epizoötic among animals, a disease simulating it and believed by some to be identical with it, appeared and became quite general. The constitutional symptoms in some cases were well marked and decidedly severe, but I can learn of no cases which were fatal. Early in the winter there were some severe cases of pseudo membranous croup, and a few deaths therefrom. There has also been during the year considerable inflammation of the throat accompanied in some instances with an exudation upon the ton-

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

sils, called diphtheria by some. I am inclined to the opinion that a portion of the cases of diphtheria reported above were cases of this kind, as true diphtheritis, with the peculiar organized membrane so characteristic of the disease, is very rare in this community. It has never, to my knowledge, prevailed as an epidemic, but contrary to the expressed opinions of some physicians, I believe it does occur occasionally as an endemic disease, and that there have been a number of cases the past year. Of local diseases our oculists report a large number of cases of purulent ophthalmia, communicated in most instances by carelessness.

8. There have been no cases of cholera or small-pox during the year.

9. Cannot answer that.

10. Have been none.

11. Malarial fevers, inflammations, scarlet fever, and diseases depending upon accidental or general causes, are the diseases prevailing at the time this report is made.

12. No.

13. The epizoötic prevailed quite extensively amongst horses during the fall, but I know of no other form of disease which has affected animals.

14. The crops in this county have, as a rule, been unprecedented in its history, both as regards the yield and the quality. This is especially true of vegetables, which were very free from disease. So far as I can learn by inquiry, the cereals and grasses were not affected by rust, smut, "bunt," mildew or mould; that is to any considerable extent. As regards wheat, it is estimated that at least two-thirds of the flour consumed in this city is manufactured at our flouring mill, and so much care is taken to cleanse the grain from all foreign substances by a variety of ingenious machines that it is all but impossible for diseased berries to find their way into the flour did they exist in the wheat.

15. The condition of rye, oats, corn, buckwheat and other grains was, on the whole, good when ready for market. The cold wet fall interfered somewhat with the ripening of the corn, and while the yield was unprecedented, there were a great many soft ears, but no fungus either in this or other grains. The wheat crop was also affected by the rains, and some of it was "put-up" and brought to market in a damp, musty, condition. This our millers refused to purchase.

16. The wheat was generally allowed to get thoroughly dry before it was threshed, but there were a few exceptions as noted above.

17. Wheat buyers do not answer this question satisfactorily.

18. The hay crop was less than usually affected by mildew or mould. It was secured before the fall rains.

19. I cannot give a summarized statement of the meteorological conditions during the year, as I have no data at hand and can only give facts from memory. The early part of the year was noticeable for the extreme and continuous cold weather followed by a cold backward spring,—a foot of snow falling as late as May 1st. Late in May and early in June, there was a succession of heavy rains followed by a comparatively cool summer, with a moderate amount of rain fall. In August there were more heavy rains, which were succeeded by a late and cold fall. The winter thus far has been noticeable for its unusual mildness, the mercury registering 70° Dec. 31st. I can recall no meteorological conditions of peculiar significance that have occurred during the year. The year, in fact, has been what may be called an unusually "healthy" one for this locality—a condition of things the weather has had much to do with.

20. I have learned of one instance of the causation of typhoid fever by the use of surface water which was no doubt impregnated with animal matter from a neighboring privy. The disease affected four members of the family, and there was no other cause apparent. But the use of surface water in the city is almost obsolete, and I trust will soon be entirely so. I have no other cases at hand illustrating the causation or communicability of diseases.

Bay City, Mich., Dec. 31, 1875. W. H. BURR, M. D.

REPLIES BY G. B. ALLEN, M. D., OF CHARLOTTE, MICH.

Secretary State Board of Health:

SIR:—You will herewith please find answers to "Circular" relative to prevailing diseases. Possibly they may not be as satisfactory as could be desired, but, under circumstances, they are the best I can give. They are for Charlotte and vicinity for the year ending Dec. 31st, 1875:*

*The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

1. Less. Diminished 50 per cent.
2. Less. Diminished in my judgment nearly 50 per cent.
3. No diseases or causes of death have been more than usually prevalent.
4. Typhoid fever, measles, and all autumnal fevers.
5. None.
6. Typhoid fever, measles,—all autumnal fevers.
7. Small-pox,—one mild case of varioloid. Of other diseases named, it is impossible to even try to approximate an opinion, as no record has been kept from which to estimate.
8. I believe there have been cases of all named, except perhaps epidemic and infectious.
9. No data from which to report.
10. None that I can learn.
11. No prevailing diseases at present except catarrhal affections.
12. No.
13. Epizoötic among horses, prevailed to almost an universal extent.
14. Potatoes good; hops good; fruit "blasted" before budding; clover was frozen by severe winter; old seeding meadows injured by severe winter. Wheat was not very much injured by rust, smut, bunt, or mildew; the latter slightly injured wheat which was early cut and in "shock."
15. Rye is not raised in this locality to any extent. Oats were a large crop and in an excellent condition. Corn was injured by early frosts. Buckwheat was a large crop and in good condition; but very little "fungus" found.
16. In the early part of the season, the wheat was quite damp when brought in, but later it was dry.
17. Wheat "banks" some, but not more than the general average.
18. Hay was not more than usually affected by mould.
19. Cannot give it, as I cannot learn of any regular observations made, or records kept, which is to be regretted. The year was a remarkable one, being cool, and, in comparison with few years previous, more moist.
20. No facts to communicate.

In question 7 I would be glad to make more definite answers, but none of our physicians have been accustomed to make reports; but the coming year we hope to improve and be able to make a better showing.

Yours respectfully,

Charlotte, Jan. 3, 1876. G. B. ALLEN.

REPLIES BY E. P. CHRISTIAN, M. D., OF WYANDOTTE, MICH.

Secretary of the State Board of Health:

DEAR SIR:—Herewith I send answers to queries in Circular marked 11.*

1. Decrease, according to my judgment, amounting to full 20 per cent.
2. Proportion of deaths much less; can not say how much less, but think the proportion accorded with decrease of sickness.
3. None.
4. Scarlet fever, measles, diphtheria, typhoid, and zymotic diseases generally, as well as the endemic diseases of the locality.
5. From none.
6. Scarlet and typhoid fevers.
7. No small-pox. Several cases of cholera morbus, which in a cholera season would have been designated as Asiatic cholera. Probably a dozen,—or may be twenty,—cases of typhoid fever; no measles; a few cases of whooping-cough (not epidemic); no cerebro-spinal meningitis; very few cases of diphtheria, of a mild type; and no other contagious or infectious disease has appeared.

SCARLET FEVER.

Miss Anna W., age 16–17, sickened with scarlet fever in latter part of February. There had been no cases of the disease in Wyandotte for a long time, and I could trace no exposure. Perhaps contracted contagion in Detroit or in cars going up and down occasionally. Had the disease in its severest anginose form and was long in recovering. Was not able to go out until late in April or fore part of May. A rigid quarantine was established and no other case was seen until the middle of July, when

*The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

Miss Lettie P., of about the same age, one of her companions, and living within three doors of Miss W., sickened with scarlet fever and had it in the same severe form. No exposure could be traced in this case. Both young ladies attending the same school, among all the scholars of which no other case occurred. Miss Lettie had had no intercourse with Miss Anna during the time of her sickness, nor until her complete convalescence; but a short time before she sickened had borrowed and read a *book* which Miss Anna was reading during her recovery.

Was this *book* the vehicle of contagion? I think so. I have known of the following: A family, the children of which had just passed through scarlet fever in a severe form, moved out of a house in early winter; the house remained empty all winter and was occupied in spring by another family in which the disease broke out a very short time after occupying it, and no other cases in the place at the time, nor for weeks previous. Cold weather, by preventing decomposition, may preserve contagion indefinitely, while warm weather the sooner destroys contagion by promoting disorganizing tendencies. Last spring and early summer were cool and contagion would be longer preserved.

In Miss Lettie's case, as in Miss Anna's, a rigid quarantine was established, and the only other case arising from it was that of an infant two weeks old, who was exposed before the disease was fully developed, that is, before the rash made its appearance. The infant had the disease quite severely, but recovered. No other cases have been seen since then (July).

8. No small-pox; no measles; no cerebro-spinal meningitis.

9. No prevailing diseases; occasionally typhoid or typho-malarious diseases in addition to ordinary endemic diseases.

10. Typhoid fever in October, more than usually prevalent and also more fatal.

11. No prevalent diseases; very little sickness.

12. None.

13. The epidemic influenza (epizoötic).

The remainder of the questions I am unable to answer with much definiteness.

14. Potatoes, especially peachblows, have been more than usually subject to rot.

15. Cereals and hay very generally suffered from the excessive dampness of the harvesting season.

16. Much of it was injured by dampness.

17. Yes.

18. Probably more affected.

19. Much cooler and more rain.

20. ———.

E. P. CHRISTIAN, M. D.

Wyandotte, Mich.

REPLIES BY JOHN BELL, M. D., OF BENTON HARBOR, MICH.

Prevailing diseases, 1875:*

1. About one-half the amount of sickness, compared with previous years.

2. Less. Could not average.

3. Broncho-pneumonia of children and pneumonia of adults have caused altogether the most deaths, but not more probably than previous years.

4. All other diseases.

5. None.

6. Scarlet fever, diphtheria, cerebro-spinal fever.

7. Scarlet fever (30 cases), typho-malarial (about 10), whooping-cough (2 or 3), cerebro spinal meningitis (4 were buried), diphtheria (12).

8. Small-pox, measles, cholera.

9. January—Scarlet fever, diphtheria, pneumonia, broncho-pneumonia, remittent fever, rheumatism. February—Diphtheria, scarlatina, pneumonia, pleuro-pneumonia, broncho-pneumonia, erysipelas. March—Scarlatina, diphtheria, broncho-pneumonia. April—Pneumonia, intermittent fever. May—Erysipelas, intermittent fever. June—Erysipelas, intermittent fever. July—Intermitting fever, bowel troubles, such as diarrhea of a mild form. August—Intermittent fever, rheumatic fever, neuralgia, diarrhea, remittent fever. September—Remitting fever, diarrhea, dysentery. October—Typho-malarial fever, pneumonia, remitting fever. November—Typho-malaria,

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

cerebro-spinal, scarlet fevers, pneumonia, neuralgia. December—Scarlet fever, pneumonia, neuralgia, rheumatism. There has occurred during the year 2 cases of cancer of the stomach (in my practice), verified by *post mortem*.

10. Nothing in this line.
11. Scarlatina of a mild form, pneumonia, neuralgia.
12. No.
13. Epizoötic during October not so severe as 1872; a few cases of death, however.
14. Not to any extent, excepting corn.
15. No more than usual.
16. Considerable wet wheat.
17. The first brought in required considerable care; at present they have no trouble.
18. Hay was secured in first-class condition.
19. See table as follows:

Months.	Thermometer. Highest.	Thermometer. Lowest.	Prevailing Winds.	Snow and Rain.	Days All Clear.	Ozone. Range.	Ozone. Average.	
Jan.	37°	-10°	westerly.	considerable snow...	3	2 to 10	3 to 6	
Feb.	42°	-14°	westerly.	consid'r'ble snow thunder shower.	6	run out of	test paper.	
Mar.	83°	3°	easterly..	snow and rain	6	4 to 9	5 to 8	Considerable number of foggy days.
April	78°	18°	westerly.	rain and snow	9	3 to 10	5 to 7	Smoky, thunder.
May..	94°	33°	westerly.	snow, rain	14	3 to 10	5 to 7	Thunder, lightning, foggy.
June..	88°	46°	westerly.	heavy rains.....	4	2 to 9	5 to 7	Thunder showers, foggy.
July..	87°	60°	easterly..	heavy rains.....	7	2 to 8	4 to 6	
Aug...	92°	51°	westerly.	heavy and light rains...	2	1 to 9	5 to 8	
Sept...	90°	39°	westerly.	light and heavy rains..	9	2 to	5 to 6	Light snow squalls on 29th, — heavy wind and hail storm, thunder and zigzag lightning. Several hundred panes of glass broken in the village of Berrien.
Oct. ..	73°	30°	westerly.	heavy and light rains ..		2 to 8	5 to 6	
Nov...	49°	9°	easterly..	light rains and snow ...	1	2 to 9	3 to 5	
Dec. .	65°	9°	westerly.	heavy rains, light snow..	none.	1 to 8	3 to 5	

JOHN BELL.

Benton Harbor, Michigan.

REPLIES BY LEARTUS CONNOR, M. D., OF DETROIT, MICH.

Secretary of the State Board of Health:

DEAR DOCTOR:—Your circular, No. 11, was received some weeks since. I have failed to obtain sufficient data for a satisfactory answer to its inquiries. In Detroit there has been no epidemic or endemic, no special cause of death of note. This city has been alarmingly healthy. Vital statistics cannot be obtained with even an approximation to accuracy here under our present system. Am sorry to be unable to make any better report; but I will not manufacture one out of guesses.

Your friend,

Detroit, Mich., Jan. 7, 1876. L. CONNOR.

REPLIES BY J. C. McILVAIN, M. D., OF LAMONT, MICH.

Answers to questions in Circular No. 11:*

1. Less.
2. Less.
3. Consumption.

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

4. Malarial.
5. Consumption.
6. ———.
7. No small-pox; no cholera; two or three cases of scarlet fever; two or three of typhoid fever; measles becoming quite prevalent within the last month; no cerebro-spinal meningitis; no diphtheria.
8. Small-pox, cholera, cerebro-spinal meningitis, diphtheria.
11. Remittent fever and measles.
12. None.
13. So-called epizoötic.
14. ———.
15. Corn and buckwheat not sufficiently ripened before the frost.
16. Yes.
17. No.
18. Hay crop was well secured.

Yours respectfully,

J. C. McILVAIN.

Lamont, Jan. 5, 1876.

REPLIES BY MILTON CHASE, M. D., OF OTSEGO, MICH.

To the Secretary of the State Board of Health:

SIR:—The following is my reply to Circular No. 11 from your office: *

1. Less than usual by about one-fourth.
2. About the same.
3. Cerebro-spinal meningitis.
4. None.
5. Cerebro-spinal meningitis.
6. None.
7. Scarlet fever has been present most of the time for the past year. It has been of a mild form, and I have seen no bad *sequellæ*. The German measles, or Rötheln has been about us most of the time during the past year, and this has made much confusion in the diagnosis (by the laity) of cases of measles and scarlet fever. Many cases of measles and scarlet fever have been called German measles, and *vice versa*. Many of these cases occur without a physician seeing them. Measles have been about, much of the time, during the past year, and has been confused, as was scarlet fever, with the German measles. I have seen no bad cases of *sequellæ* from this disease. Cerebro-spinal meningitis was about us in July, August, and September. I had five cases and lost two. I think that the experience of other physicians located here was about with mine. Diphtheria, I have had three cases; all recovered. I have not heard the other physicians complain of this disease. I think there have been but few cases, and they have been mild. There seems to have been an epidemic influenza about us last spring and this fall. The laity called it epizooty. It was not a severe disease.
8. Small-pox, cholera, typhoid fever.
9. Have no data for this.
11. Erysipelas, pneumonia, mumps, and measles.
12. Erysipelas, mumps, and measles. None are especially severe.
13. Epizooty lightly.
14. Smut among corn.
15. A great amount of corn was not ripened, and very little seems to be really good.
16. Yes.
17. About as usual.
18. No.
19. No data.

My report is made to cover my field of practice, viz.: Otsego village and township, and the townships of Watson and Trowbridge, in Allegan county; the township of Alamo, in Kalamazoo county, and the township of Pine Grove, in Van Buren Co.

Yours respectfully,

MILTON CHASE, M. D.

Otsego, Jan. 10, 1876.

*The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

REPLIES BY NELSON I. PACKARD, M. D., OF STURGIS, MICH.

Secretary of State Board of Health:

DEAR SIR:—In reply to Circular 11, I answer as follows. I only reply in regard to the southern part of St. Joseph county.*

1. At least 10 per cent less.
2. I *think* mortality about 15 per cent less.
3. None.
4. Malarious, less than usual.
5. None.
6. Scarlatina, peritonitis, cerebro-spinal meningitis.
7. Scarlatina simplex 10 to 15, measles 1, whooping-cough few, cerebro-spinal meningitis 3, diphtheria 5, typhoid fever 4.
8. Cholera and small-pox.
9. No prevailing epidemic influence manifest in any month of the year. An unusual number of cases of croup, both spasmodic and membranous during the prevalence of the damp warm weather in December.
10. ———.
11. Catarrhal affections of respiratory organs.
12. None.
13, 14, 15. ———.
16. Wheat threshed before fully dry, buyers say often "musty."
17. "Banks" in bin more than usual.
18. Hay often mouldy.
19. Can't give monthly statement of meteorological conditions. A less amount than usual of sunshine, and a notable increase of rainfall characterized the summer in this part of State.

Very respectfully,

NELSON I. PACKARD, M. D.

Sturgis, St. Joseph Co., Jan. 8, 1876.

REPLIES BY REV. L. M. S. SMITH, OF GRAND HAVEN, MICH.

Secretary of the State Board of Health:

DEAR SIR:—To the several questions of Circular No. 11, I answer:*

1. Less, one-fifth.
2. Less, one-half.
3. Measles of mild type. On the low lands of the city, typho-malarial fever.
4. Except on the lower lands, malarial diseases generally.
5. None.
6. Measles, cholera infantum, malarial fevers, scarlet fever.
7. Small-pox, none; cholera, one; scarlet fever, about 25; typhoid fever, about 5; measles, probably 250; whooping-cough, a very few; cerebro-spinal meningitis, none; diphtheria, about 6; epidemic, endemic, contagious or infectious diseases, none, except as above indicated.
8. Small-pox, cerebro-spinal meningitis.
9. Can't do it. Malarial diseases of mild type prevailed most in July, August and September.
10. No record of any.
11. Measles, pneumonia.
12. No.
13. Epizoötic, quite a number of cases, and a few deaths.
14. Nothing. Crops suffered from drought in early part of season, and some from early fall frosts.
15. All good except corn and potatoes, injured by early fall frosts.
16. Yes.
17. No.
18. Well secured.
19. Dec. 1874 was a very mild month; winter hardly commencing till January.

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

MONTHS, 1875.	TEMPERATURE.					RAIN, SNOW, AND FROST.
	Mean.	Highest.	Lowest.	Warmest day (mean).	Coldest day (mean).	
January	14.07°	35.°	—10.°	31.33°	—5.33°	Rained 1 day, snowed 28 days.
February	8.66	35.	—29.	29.66	—13.5	Rained 1 day, snowed 13 days.
March	25.3	65.	—4.	55.	8.67	Rained 3 days, snowed 11 days.
April	36.57	73.	14.	67.66	16.	Rained 4 days, snowed 4 days.
May	53.5	90.	30.	73.33	34.	Rained 8 days, snowed 1 day, hard frost 17th, and slight frost 30th.
June	61.37	84.	42.	71.	48.	Rained 7 days, frost 13th and 14th.
July	69.84	80.	53.	72.67	61.	Rained 9 days.
August	61.	84.	42.	75.33	51.	Rained 7 days, sharp frost 23d.
September	56.1	84.	36.	77.	42.	Rained 10 days, frost 11th and 18th.
October	45.40	64.	29.	59.33	32.67	Rained 14 days, snow fell 11th, 15th, 26th, 27th, 30th.
November	32.57	51.	2.	47.67	3.67	Rained 5 days, snowed 7 days.
December	31.9	58.	9.	50.	10.33	Rained 11 days, snowed 8 days.

So far in January, 1876, the weather has been exceedingly mild. Mean of first nine days, 37. Yesterday, 3 P. M., a furious storm from W. and N. W. began, and continues at this writing.

20. I cannot answer.

I have delayed my answers to No. 11 a few days to secure a fuller meteorological statement. I fear my statements on the several topics of the Circular will hardly meet your desires, but it is the best I can do. I shall be glad of any suggestions on the subject.

Very truly yours,

Grand Haven, Jan. 10, 1876. L. M. S. SMITH.

REPLIES BY JOHN P. STODDARD, M. D., ALBION, MICH.

Secretary of the State Board of Health:

DEAR DOCTOR:—In reply to your Circular No. 11, of date of December, 1875, permit me to answer as follows:

I answer for the locality of Albion village and the surrounding country at a radius of 3 or 4 miles:*

1. Less. Twenty-five per cent.
2. Less. Can't give exact figures, but should judge a third less.
3. No one cause has been more than usually prevalent, except diphtheria.
4. All.
5. Diphtheria, and perhaps typhoid fever. Although there were only three deaths from diphtheria, these were the only cases of the kind for the past ten years.
6. All diarrheal and dysenteric diseases, as well as all malarious and rheumatic affections.
7. There has been no case of small-pox; none of cholera; only one of scarlet fever; not over 6 or 7 of typhoid fever; a very few cases of measles or whooping-cough; none of cerebro-spinal meningitis; three of diphtheria, two of which were fatal. There have been two very generally prevailing epidemics of a sort of influenza or human epizoötic,—one last spring and another this fall late.
8. Small-pox, cholera, and cerebro-spinal meningitis.
9. Can't do so.
10. During the last days of last January one family were attacked with diphtheria, and out of the three two died. The affection went no farther.
11. Mostly inflammatory, and that of the nasal or bronchial passages.
12. None.
13. Epizoötic quite generally among horses late last fall.
14. None as I know, except rust in wheat, which was rather more prevalent than usual.
15. Not as I know.

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

16. Not so much as last year.
17. They say it "banks" more.
18. Very well secured.
19. Cannot do so.
20. A young Mr. Brown came from Grand Rapids to his home in this village about the middle of last January. Diphtheria was at that time somewhat prevalent at Grand Rapids. After being at home about two weeks he came down with that disease. He died. The disease was communicated to a younger brother and sister, also to his mother. The brother and sister died, but the mother recovered. Care was taken to keep all unnecessary visitors from the house, and it spread no further. I did not treat these cases.

The first of last December, a lady about 20, living half a mile from our village, came down with scarlet fever. She had not been out of town for months, and there had certainly been no previous cases for months in the village. It was a well developed case. There being no other children in the family, and care being taken to keep others from the house, it went no further. Although I did not treat the case, yet I have made very careful inquiries into the probable cause, and can come to no other conclusion than it must have been communicated from some article of merchandise.

Truly yours,

Albion, Mich., Jan. 13, 1876. JOHN P. STODDARD.

REPLIES BY EDWIN STEWART, M. D., OF MENDON, MICH.

To the State Board of Health:

GENTLEMEN:—My locality is in the village of Mendon, on the north bank of the St. Joseph river, about 16 or 18 feet above the water in the river. The timber here and in most of the surrounding country was such as grows on oak openings. The soil is sand and gravel. On the south side of the river and separated from it by a fringe of timber is Nottawa Prairie. We have two or three sections of mowing marsh. North of us is three or four sections of rolling, stony land, with some stagnant water pools. This stony (boulders) country has been always comparatively free from ague, but lately afflicted with diphtheria more than other localities. We have some timbered land within our ride. I have answered from personal knowledge. I have known o the Vicksburg epidemic that will be brought to your notice; also, of the case of cerebro-spinal disease, but I think that was sporadic and not epidemic.

Answers to questions in Circular No. 11.*

1, 2. Less by about one-half.
3. Not any.
4. I think all, but especially malarial.
5. Not any.
6. Malarial, pulmonary, and perhaps all.
7. A few of measles, 22 of diphtheria.
8. None that I know of, except as above.
9. It has been so healthy that this is difficult to answer.
10, 11, 12. No, not any.
13. Epizoötic, catarrhal lightly.
14. None except some rust in wheat.
15, 16. No.
17. More.
18. Less.
19, 20. I have no notes that I think of any importance.

Our attention being directed to these subjects now, we shall be better prepared hereafter.

Very respectfully,

Mendon, Jan. 18, 1875. EDWIN STEWART.

REPLIES BY ARTHUR HAZLEWOOD, M. D., OF GRAND RAPIDS, MICH.

Secretary of the State Board of Health:

DEAR SIR:—As answers to questions in Circular No. 11, from your office, I submit the following:*

1. Diminished,—about 40 per cent.

*The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

2. Taking increase of population into account, somewhat diminished.
3. Measles and whooping-cough.
4. Malarious fevers.
7. Have heard of one or two cases of varioloid, the disease contracted elsewhere. Isolation and hygienic care prevented any spread of the disease. Scarlet fever, a few cases; not very prevalent, nor more than usually fatal. Typhoid fever, number of cases, somewhat less than in past two or three years. Measles and whooping-cough have been epidemic here, and consequently mortality from those two diseases or their sequelæ, increased. Cerebro-spinal meningitis, have seen two cases of the intermittent variety. Diphtheria, a few cases.
8. Cholera.
9. January—Scarlet fever, pneumonia. February—Remittent fever, diphtheria. March—Scarlet fever, pneumonia, remittent fever, rheumatic fever, diphtheria. April—No new cases under these heads. May—Pneumonia, remittent fever. June—No new cases, under these heads. July—Remittent fever, typhoid fever. August—Pneumonia, remittent fever, typhoid fever. September—Typhoid fever. October—Typhoid and remittent fevers. November—Remittent and rheumatic fevers, and cerebro-spinal meningitis. December—Diphtheria. Measles and whooping-cough epidemic for past three months. Answers to this question are taken from my personal experience.
10. The two cases of cerebro-spinal meningitis occurred in November, both children were of one family, aged respectively six and one years of age. The elder was the first attacked; the younger being for the most part in the same room, was subsequently attacked, and the course of the disease seemed to be more rapid, as the younger died first by 48 hours. No cause of special import is apparent.
11. Catarrhal affections and measles.
12. Measles.
15. The corn crop, from early frosts, failed to mature,—soft corn therefore abounds and is becoming affected by mould.
19. February and March intensely cold and stormy,—winter protracted into May. Some few hot days, but summer generally cool. September, after first few days, was chilly and rainy, with one or two sharp frosts. December, has been mild in temperature.
20. August 24th I was called in to see two children, 11 and 14 years old, whose symptoms and subsequent course of the disease proved that they were suffering from typhoid fever. The patients are members of quite a large family, residing in a house adjacent to gas works and the railroad; the main floor of the house being several feet below the street and the soil mucky. Subsequently the mother of the family was attacked with symptoms somewhat similar but not of so great intensity; and again after the convalescence of these three members of the family, two other children were attacked. In former years I have seen cases of sickness in this same house, and have always attributed much of it to the unhealthiness of its location; and the subsequent medical history of a family formerly residing in it, but now in a healthy portion of the city and in a house with much better sanitary surroundings, confirms me in the opinion. The water used for drinking purposes is obtained from old hydraulic company's log service, and cannot be charged with the disease.

Very respectfully,

Grand Rapids, Jan. 18, 1876. A. HAZLEWOOD.

REPLIES BY O. E. HERRICK, M. D., OF GREENVILLE, MICH.

Secretary State Board of Health:

DEAR SIR:—My practice is in this city, which has a population of about 3,500, and also for an area of about ten miles into the country. My country practice is in a malarious district, and that in the city is more or less affected by the same causes:*

1. The sickness in this city has decreased more than one-half during the year ending Dec. 31st, 1875, and in the country it has diminished perhaps one-fourth, though malarious diseases are about the same in the country as other years, and the difference is owing to the fact that they are more prevalent in the country, and especially here where there is so much manufacturing of lumber, leaving the vast amount of sawdust and barks to decompose upon the ground.
2. The number of deaths have diminished perhaps more than the sickness, from the fact that our diseases have nearly all been very mild in form.

*The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

3. Diphtheria has been more than usually prevalent, and I think consumption and typho-malarial fever have also been rather more prevalent than usual.

4. Scarlet fever, measles, whooping-cough, and malarious diseases have been much less than usually prevalent.

5. Typho-malarial fever has been attended with unusual mortality; diphtheria also. The unusual amount of mortality in typho-malarial fever I attribute to the miserable condition of our cesspools and close proximity of privy vaults to water supply; also an old cemetery on one side of our city. I have noticed that some of the worst cases of fever have occurred within a stone's throw of the cemetery. There has been more than the usual amount of mortality from cholera infantum this year, also, and I think that is from the same cause.

6. What scarlet fever we have had has been very mild, and pneumonia, peritonitis, erysipelas have been attended with less mortality.

7. ——.

8. There has been no small-pox, cholera, typhoid fever, cerebro-spinal meningitis.

9. January we had pneumonia, pleuritis, peritonitis, malarial fever, acute rheumatism. February we had the same, with the addition of erysipelas, scarlet fever. March, absence of peritonitis, and scarlet fever on the decline, and the addition to last month of measles. April, quite a large amount of acute rheumatism,—more than during the winter months,—with a dropping off of pneumonia, pleuritis, and cessation of scarlet fever; intermittent fever on the increase. May, whooping-cough, intermittent fever. June, whooping-cough, bronchitis, intermittent fever. July, intermittent fever, diarrhea, and a tendency to erysipelas in all wounds. August, same as July, and the addition of dysentery and a few cases of typho-malarial fever. September, typho-malarial fever increased very much; intermittent fever, diarrhea, dysentery. October, same as September, with the addition of cholera infantum. November, typho-malarial fever; dropping off of pneumonia, bronchitis; a few cases of puerperal fever. December, about the same as November, only more pneumonia and bronchitis, and there has been quite an epidemic of catarrh.

10. None.

11. Bronchitis and intermittent fever, pneumonia.

12. No.

13. I do not know.

14. I do not know.

15. Corn was affected with fungus; oats was not; other grains were in good condition.

16. Yes.

17, 18. No.

20. I had a case of an old gentleman about sixty years of age; he was an office patient; and I treated him for about three months for general debility. He seemed to be in an anæmic condition, with disorders of the stomach and bowels; no appetite, and seemed to grow gradually weaker despite tonics, stimulants, and all treatment. The case went along until he was too weak to come to the office, and I had to go and see him, when the color of the wall paper on the walls of his bed room and parlor attracted my attention, and I ordered it removed, and the walls whitewashed. After a couple weeks the old gentleman began to mend quite rapidly, until now he is enjoying his usual health. The other members of the family did not occupy these apartments very much. The parlor was used by the old gentleman as a reading room, and the bed room as a sleeping room, and he was exposed to the influence, if there was any, nearly all the time. I will send you a sample of the paper with this report. Please make an analysis and let me know the result. I think it was a case of arsenical poisoning. *a*

There is another subject I wish to call the attention of the Board to, and that is *sawdust as a generator of malaria.* In the lumber regions of this State sawdust is a necessary evil of great magnitude; it is made in vast quantities in a number of counties, and in three or four covers perhaps ¼ of their surface, and year after year its quantity is added to instead of being diminished; more surface is being covered, and it is put on thicker over the surface which is already covered. That it is necessarily a breeder of disease, is no question; it does not require a medical mind to discover that fact. It is beat upon by every rain until it is saturated with moisture, and then in summer the sun beats upon it and it must necessarily commence to decay, and the product of decomposition is noxious gases, and if the theory of vegetable decom-

(*a*) The paper had figured upon it many rather large green leaves, which the test by ammonia and nitrate of silver showed to be composed of aceto-arsenite of copper.—H. B. B., *Secretary.*

position producing malaria is true, then we have a regular malaria-producing laboratory in active operation in every lumber yard in our State; and if there was no such theory known, the results well known to every physician practicing in these localities would most certainly show it. I do not know of a single sawmill without the population all about it are having the ague constantly all through the summer months, and many times lasting all winter, from the thorough saturation of the system with the poison. Many mills have to employ two sets of hands to keep their mills running, and I have known some to be obliged to shut down to give the operatives time to go home and shake. Now if the persons living in the immediate neighborhood are so affected with it, why may not the health of the whole community for many miles around be affected to a great extent? I have noticed many times when riding along roads covered with sawdust, and through lumber yards, that as soon as I struck on to it I would feel chilly sensations even in our warmest summer days, and who shall say that we have seen the worst of it yet? it strikes me we have not, for it will mix with the earth, and lay there for years decaying and giving off its deadly gases. Then, too, it is in many places thrown into the streams by the tons from the mills, and left to float down stream to lodge where it may, and it may be found in the bottom lands all along the line of the stream in large quantities. And still the work goes on. Something should be done.

O. E. HERRICK, M. D.

Greenville, Jan. 1, 1876.

REPLIES BY H. C. CLAPP, M. D., OF MENDON, MICH.

Secretary of the State Board of Health:

DEAR DOCTOR:—The locality for which I report as per request of "circular," is the village of Mendon, and the surrounding district of five miles each way.*

1. Much less sickness—one-third less at least.
2. Deaths less; less in proportion to sickness and to the number of inhabitants.
3. Diphtheria—mostly 3 miles north, in a clayish, stony, soil, with considerable wet marshy country.
4. Malarious.
5. Diphtheria—mostly north of village.
6. Malarious and inflammatory, especially pneumonia.
7. (Quite a number cases of small-pox occurred last spring northwest of us, in the vicinity of Vicksburg, Kalamazoo county, reaching to within nine miles of us, some three or four fatal, half a dozen of which I saw; although some physicions called it chicken-pox.) Dozen cases of measles, two of scarlet fever, one of cerebro-spinal meningitis, twenty-five or thirty of diphtheria, four deaths,—many very mild, and three of mumps.
8. Small-pox, cholera, typhoid fever, whooping-cough, and no endemic, epidemic, or other contagious or infectious diseases other than mentioned.
9. January—Neuralgia, rheumatism, pneumonia, and erysipelas; February—erysipelas, rheumatism, and consumption; March—Scarlatina, hepatitis, and consumption; April—Scarlatina,—consumptives mostly die; May—Pneumonia, mumps, and an endemic of canker sore mouth and sore throat in two neighboring families,—one death, not in diphtheria locality, and the cause of which was thought to be the use of an old copper bottomed coffee pot; June—Bilious intermittents; July—Diphtheria, erysipelas, rheumatism, bilious intermittents; August—Bilious intermittents, measles, quinsy; September—Bilious remittents and intermittents, diphtheria, measles; October—Bilious remittents and intermittents, diphtheria; November—bilious remittents and intermittents, measles, cerebro-spinal meningitis, 1; December—Few intermittents,—"nothing more."
10. Diphtheria,—one case in village July 6, but a majority of all the cases occurred some three miles north of us in September, and again one or two in the village about middle of October. Deaths were about twelve per cent. One case of crebro-spinal meningitis in the village the 25th of November,—fatal,—girl 10 years old.
11. Nothing but very slight catarrhal.
12. None.
13. Hog cholera to a limited extent; epizoötic mildly among horses.
14. Wheat was affected slightly in some localities with rust; other crops not unusually diseased.

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

15. No.
16. Yes.
17. They say not.
19. Took no notes; has been a remarkably cool season.
20. We seem, for some reason or other not understood by us, to be subject to diphtheria. We had more cases, with double the fatality, in 1874 than in 1875. During the past twelve years we have had several severe endemics of it. With the exception of that, it has been unusually healthy in our locality during the past three years.

Very respectfully yours,

Mendon, Mich., January 26, 1876. H. C. CLAPP.

REPLIES BY L. S. STEVENS, M. D., OF THREE RIVERS, MICH.

DEAR SIR:—The following are the best statistics I can make in answer to the questions in Circular No. 11:*

1. About one-third less.
2. Less; perhaps one-quarter less than for several years past.
3. None.
4. Nearly all that prevails in this locality.
5. None.
6. Nearly all.
7. I cannot even approximate the number of cases. Scarlet fever, measles, and whooping-cough prevailed in a mild form, and I do not know of any deaths from them.
8. Small-pox, cholera, typhoid fever, cerebro-spinal meningitis.
9. January and February, colds and congestions of the throat and lungs. March, April and May, eruptive diseases, not serious. June, July and August, intermittents of a mild form. September and October, ague and fevers of a malarial origin. November and December, measles and whooping-cough, and a mild form of scarlet fever.
10. None.
11. Milder forms of intermittents and measles.
12. No.
13. There has prevailed in this vicinity quite extensively a disease among horses, the symptoms of which have been a cough and free discharge from the nostrils, with shortness of breath when exercised; not fatal, and did not disable the animal in but a few cases. Also a disease called cholera among the hogs, quite fatal and universal for a short time in the fall.
14. None.
15. I think not, so far as I can learn.
16. Yes.
17. Less than usually liable to "bank."
18. Less.
19 and 20. Not having suitable apparatus for making the necessary investigations, I could not with any degree of accuracy give satisfactory answers to the two questions.

Respectfully,

Three Rivers, January 1, 1876. L. S. STEVENS.

REPLIES BY GEORGE W. TOPPING, M. D., OF DE WITT, MICH.

Secretary of the State Board of Health, Lansing, Mich.:

DEAR SIR:—A reply to your Circular, No. 11, has been delayed, partly on account of want of time, and partly on account of an apparent impossibility on my part of giving replies, to many of your interrogatories, for which I can claim a much greater degree of accuracy than such as can be attached to mere guesses, by one having some opportunities to judge of the subjects considered. My replies are for the territory in which I mostly practice medicine, viz.: from 4 to 6 miles distant from here in all directions,—comprising parts of the townships of De Witt, Olive, Bath, Victor, Watertown, and Riley:*

1. There was one-quarter less sickness last year than the year before; or 25 per cent less in 1875 than in 1874, as shown by my practice.

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

2. Probably about 20 per cent less than the average.
3. Scarlatina and acute albuminuria.
4. Cannot say.
5. See No. 3.
6. Do not know.
7. No cases of small-pox; a very few of cholera infantum. Cannot give the number of cases of any of the diseases mentioned.
8. Small-pox, Asiatic cholera.
9. Can not.
10. During February and March, scarlatina was unusually prevalent and fatal.
11. Bronchitis, whooping-cough, rheumatism, catarrh.
12. No fatal diseases; a considerable number of cases of bronchial catarrh.
13. In January, 1875, and during December last, there has been a good deal of epizoötic among horses, but it has been seldom fatal.
14. Do not know.
15. Do not know of their being affected by fungus.
16. No; threshing commenced early. Wheat in stacks.
17. Don't know.
18. Don't know.
19. Can't do it.
20. Have none of interest.

De Witt, Mich., Jan. 20, 1876. GEORGE W. TOPPING.

REPLIES BY J. ANDREWS, M. D., OF PAW PAW, MICH.

Secretary of the State Board of Health:

SIR:—In replying to your circular relative to the prevailing diseases in this locality, I would remark that hitherto there has been no definite record kept of the diseases prevailing in this county, and therefore this statement will be based on opinions formed from observation and inquiry. My replies to your interrogatories will refer only to Paw Paw and the adjoining country, say ten miles around.*

1. In this locality I think I can safely say that the sickness during the year 1875, was at least fifty per cent less than in previous years; and it was the healthiest year I have ever known since I have been a resident of the county,—a period of thirty-seven years.
2. The proportion of deaths to inhabitants during the year 1875 was, in my opinion, from thirty to forty per cent less than in previous years.
3. There have been no diseases or unusual causes of deaths during the year 1875, most of the deaths occurring from old age and chronic diseases of long standing.
4. There has been much less typhoid fever, cerebro-spinal meningitis, and but little scarlatina.
5. There have been an unusual number of deaths from cancer, more, I think, than during any previous year.
6. There have been fewer deaths from cerebro-spinal meningitis, typhoid fever and pneumonia.
7. There have been no cases of small-pox, cholera, and but few cases of cerebro-spinal meningitis; nor have I seen or heard of a case of diphtheria.
8. Small-pox, cholera, diphtheria.
9. I could not give the diseases that prevailed each month with sufficient accuracy to make the statement valuable.
10. No unusual disease has occurred in this locality during the year.
11. There are a few cases of pneumonia, and occasionally a slight malarious attack.
12. There are none.
13. A slight form of epizoötic among horses during the fall.
14. No crop disease, I think in any part of the county.
15. Corn did not ripen well but all other kinds of grain came into market in good condition.
16. Considerable wheat was threshed in a damp condition, but as a general thing became dry before it was marketed.
17. There are no complaints about the banking of wheat in the bin.
18. The hay crop was not large, but secured in excellent condition.

*The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

19. No meteorological record has been kept so continuously as to enable me to report.

I think one of the principal reasons why we have had less sickness during the past year, is the fact that nearly all our swamp lands have been pretty thoroughly ditched and drained, and have become comparatively dry. The first effect of drainage of course was to produce an increased number of malarious diseases, and that effect we experienced pretty severely during the three years preceding 1875. The benefits we are now enjoying.

Paw Paw, Mich., Feb. 8, 1876. J. ANDREWS.

REPLIES BY A. NASH, M. D., OF LAPEER, MICH.

Answers to Circular No. 11.*

1. Less by one-third.
2. Less.
3. None.
4. Miasmatic diseases and exanthematous fevers.
5. None.
6. Continuous fever, scarlatina and measles.
7. No small-pox or cholera. Scarlet fever, number of deaths unknown. Typhoid fever unusually mild, no deaths to my knowledge. Whooping-cough, 2. Cerebro-spinal meningitis, measles, diphtheria, none; other epidemic, endemic and contagious diseases, very few or none.
8. Small-pox, cholera, cerebro-spinal meningitis, measles, and diphtheria.
9. January, 1875—Pneumonia, catarrhal affections; February, 1875—Pneumonia, rheumatism, peritonitis; March—Pneumonia, rheumatism, measles, chicken-pox; April—Intermittent fever, bronchitis, measles; May—Scarlet fever, intermittent fever; June—Diarrhœa, intermittent fever, remittent fever; July—Remittent fever, diarrhœa, intermittent fever; August—Typho-malarial fever, intermittent fever; September—Typho-malarial fever, dysentery, ague; October—Remittent fever, typho-malarial fever, dysentery, measles; November—Remittent fever, diarrhœa, intermittent fever, pneumonia; December—Pneumonia, bronchitis, inflammation of serous membrane.
10. None to record.
11. Pneumonia, typho-malarial fever, ague, phlegmonous inflammation.
12. Nothing special prevailing.
13. None.
14. Nothing unusual; crops were free from this disorder.
15. Crops all ripened well except corn; much of this was injured in the cribs, occasioned by the continued mild wet weather.
16. I think it was.
17. No.
18. Was well cured; hay is bright, of good quality.
19. I have no data available to answer.
20. The Board are already in possession of some facts pertaining to the connection of diseases which I communicated during the past season. †

I would suggest that in cases where sickness is clearly attributable to the use of impure water, samples should be sent to your office for analysis, in order to determine if possible the specific cause of similar diseases in different parts of the State.

Respectfully,
A. NASH.

Lapeer, Mich.

REPLIES BY C. MEREDYTH WOODWARD, M. D., TECUMSEH, MICH.

Secretary of the State Board of Health:

Answers to Circular 11:*

Number of inhabitants in Tecumseh estimated at 2,500.

1. Less by about one-third or one-half.
2. Less by fully one-third.
3. Puerperal convulsions, P. peritonitis, erysipelas, typhoid fever or rather *typho-malarial fever*, of which last very few, I think only *one* in about 30 cases was fatal.

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

† Published on pages 113-114 of Report for 1875.

4. Bowel diseases, cholera infantum, inflammation of the bowels, etc.
7. No small-pox, cholera, whooping-cough or cerebro-spinal meningitis. About 30 cases of measles, probably not more than 5 of scarlatina, and only 3 or 4 cases *resembling* diphtheria, but which were more of a sub-mucous congestion and infiltration of the membranes of the throat—no diphtheritic deposit. I saw one case in consultation, in which it proved fatal.
8. Small-pox, cholera, whooping-cough, cerebro-spinal meningitis.
9. Unable to do so.
10. Puerperal diseases and erysipelas, from November 15th, 1875, to present date, but all of a low rate of mortality except the first.
11. Influenza and bronchitis.
12. No.
13. Have no data. If any, of a catarrhal nature; know of one or two cases.
14. Dry-rot in potatoes. Wheat and other cereal straw affected with rust. Apples do not keep well,—incline to rot.
15. No rye in this region. Oats a good crop and good grain. Corn a large crop, but did not ripen well; much "soft corn." Buckwheat fair. Wheat was winter-killed last winter; grass grew in the bare spots—was reaped with the wheat and bound in the sheaves, mowed and stacked before the grass was dry, which made the wheat damp, straw and berry; a white mould collected in the stacks, the excessive dampness extracted much of the *gluten* of the wheat, leaving only the starchy elements and *bran* of which there is an unusual proportion. No fungoid disease noticed.
16. If the grass could have been kept out, it would have been much dryer, but even then the straw was much rusted and mildewed in the stacks.
17. Millers say that the wheat "banks" in the bin, and that the berry is shrunken.
18. Hay was nearly all secured in good condition.
19. Have no data for answering this question.
20 (*a*). Our diseases last autumn, from September to December, and many since then have been mainly of *malarial* origin,—were principally typho-malarial fever.
(*b*) In regard to prevention of death or a lessening of the rate of mortality from "removable causes," I would state that this, in my opinion, might be done by *legislation* (I speak magnanimously and without personal feeling), by the passage of an act *similar* to *Senator Thomas' bill*, and the eradication of about 8 or 10 consummate *quacks* from this place, would have an effect, not on the developement of spontaneous diseases, but principally as lessening the number of *deaths* during the year. I state this (7) not only as an *opinion*, but *positive knowledge*, which, as I am informed, need not be withheld.

I am, Doctor, very respectfully your obedient servant,

Tecumseh, Mich., Feb. 16, 1876. C. MEREDYTH WOODWARD.

REPLIES BY G. E. CORBIN, M. D., OF ST. JOHNS, MICH.

Secretary of the State Board of Health:

Replies to Circular relative to prevailing diseases. Locality—St. Johns and immediate vicinity.*

1. About the same average.
2. About the same average.
3. Scarlet fever and measles.
4. Malarial diseases, I think.
5. Scarlet fever and measles.
6. Diseases dependent upon and complicated with malarial influences.
7. No small-pox,—no cholera. As to the rest, I can't estimate.
8. Small-pox, cholera.
9. Cannot reply.
10. Can recall none.
11. Scarlet fever, measles, pneumonia.
12. Scarlet fever, measles.
13. Don't know.
14. Don't know.
15. Wheat was very fine, and harvested in excellent condition.
16. Yes.
17. Wheat was never dryer—excellent condition.

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

18. Could not have been affected with mildew,—excellent season for harvesting.
19. Cannot, as I kept no record.
20. In this cold climate we are all suffering for want of *pure air* in cold weather. Especially is this the case in our public schools and public halls,—in nearly all places where numbers congregate. 'Tis the rare exception, in the construction of either public or private buildings, that any consistent regard is had for the admission of air when the temperature compels the closing of doors and windows. The results are slow, silent, but fearful.

Very truly,

St. Johns, Mich., February 17, 1876. G. E. CORBIN.

REPLIES BY WM. C. WEST, M. D., OF MONROE, MICH.

Secretary of the State Board of Health:

DEAR SIR:—In reply to Circular No. 11: *

1. Sickness about 80 to 85 per cent.
2. Deaths about the same as the average.
3. None.
4. Fevers.
7. Small-pox, 1. Scarlet fever (probably) 15 to 20; typhoid fever (probably) 20 to 25; cerebro-spinal meningitis (probably) 3 to 4. (I have no figures but my own, therefore can only give an opinion.)
8. Cholera, measles, whooping-cough, diphtheria,—so far as I have seen or have any knowledge.
11. Bronchial.

I have heard of no complaint among animals or crops.

I hope next year to be able to make you a better report. Shall try and gather some facts as the year goes by from those about me.

Very truly,

Monroe, Mich., Feb. 16, 1876. WM. C. WEST.

REPLIES BY E. M. HUME, M. D., OF GRAND RAPIDS, MICH.

Secretary of the State Board of Health:

DEAR SIR:—Enclosed find report from your humble servant, for the city of Grand Rapids.

I have spent several days' time altogether in trying to get *facts*, but it is almost impossible to get anything satisfactory,—some physicians think it a *leading* question to ask them how many cases they have had of this or that disease, and either refuse or give false answers in order to give impression of large amount of business; and there seems to be nobody who keeps a record of diseases, and so can only give *guess* statistics.

Answers to Circular No. 11, from Grand Rapids, Mich.: *

1. Less,—*probably* 15 to 20 per cent. less.
2. Less among the young,—greater among the old, considering the increase in population it will probably average about equal.
3. Whooping-cough, measles, lung troubles.
4. Scarlet fever, infantile diarrhea, malarial, typhoid fevers.
5. Consumption, whooping-cough, measles.
6. Typhoid fever, summer complaints.
7. Small-pox, 2 cases; cholera, none; diphtheria, few cases; cerebro-spinal meningitis, very few cases; measles and whooping-cough, quite extensive; typhoid fever, 50 cases, perhaps.
8. Cholera, scarlet fever.
9. Cannot.
10. None.
11. Inflamation of lungs and air passages, measles, diphtheria.
12. Measles and consumption,—inflammation of lungs.
13. None, to any great extent.
14. None.
15. Corn soft, small, and mouldy.

*The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

16. Yes.
17. Less.
18. Less.
19. Cannot, as I have not observed, and have no instruments for observation.
20. ———.

MORTALITY REPORT of the City of Grand Rapids, commencing July 1, 1874, and ending February 29, 1876.

1874.		1875.		1876.	
		January	20	January	26
		February	27	February	35
		March	41		
		April	28		
		May	34		
		June	20		
July	10	July	32		
August	45	August	56		
September	56	September	32		
October	35	October	30		
November	29	November	26		
December	20	December	38		
			384		

I have no instruments for taking meteorological observations,—so cannot report on that.

Anything you may desire hereafter I will try and be more prompt in answering.

Respectfully yours,

Grand Rapids, Michigan, March 15, 1876. E. M. HUME.

REPLIES BY R. F. STRATTAN, M. D., OF ST. JOSEPH, MICH.

NOTE.—This report was forwarded to this Board by Dr. John Bell, of Benton Harbor, a regular correspondent of this Board. It seems to include data supplied by reports of several ob servers appointed by the Berrien County Medical Society. In a letter dated April 18, 1876, Dr. Bell says the report covered more particularly the epidemic and endemic diseases. It will be seen that consumption is not mentioned. In the same letter, Dr. Bell says: "As regards typhoid fever, I must say I have not seen but two or three genuine cases since locating here, fourteen years ago. In some seasons, we have a few cases of typho-malarial fever."

Gentlemen of the Berrien County Medical Society:

The facts and figures from which to draw up a report of the prevailing diseases of the county for the year past (1875), have not been as full as could be desired. This is to be regretted, because a comparison of observations among medical men would reveal the fact that, while malaria is a common cause of disease throughout the whole county, yet the diseases directly caused by it or complicated with it, are shaded off according to location. Thus near the mouths of the streams we have intermittent, pure and simple. Here also are seen, although less frequently than formerly, congestive chills, and pernicious fever. On the high ground back from the lake, with a greater altitude and better drainage, we find more cases of continued fever, typho-malarial, typhoid pneumonia, and an occasional case of typhoid. As an offset against our everlasting ague, we think, in such localities, scarlet fever, erysipelas, diptheria, and ordinary bilious fevers even, are more apt to assume a malignant type. But exact records are necessary to prove anything. It would be of great interest, for instance, to know from every practitioner what percentage of cases of remittent fever, before recovery, assume the continued form, and the proportion of malignant scarlet fever and sore throat to the whole number of cases.

DISEASES BY SEASONS OF THE YEAR.

I find that diseases not necessarily dangerous, are apt to be neglected in the statements of physicians. For instance, bronchitis technically expresses the woes of the subject of a common cold. During the cold months nothing is more common, and as domestic practice ordinarily provides for its treatment, but little thought is given

it by physicians. It is only when complicated with fever, that it is considered worthy of his notice. I take the liberty to class bronchitis as No. 1 among the diseases of the winter and spring months. During the same months, hardly a day passes but the Doctor is called upon to prescribe for cases of sore throat. Yet diphtheria received simply a passing notice, from one or two of my correspondents. I take the liberty to class this as second during the winter months, and, as a compromise, third during the spring.

But little need be said of the summer. June is pre-eminently the healthy month of the year. Then the good doctor makes his garden, attends the meetings of the medical associations, and prepares himself generally for the wrath to come. Later one gets gentle warning of coming events. As warm days are followed by sudden changes to cold, we meet occasionally a perfect avalanche of diarrhea. We sometimes see a sun stroke, when a drop too much or an imprudent dinner turns the table on him who walks boldly under the vertical sun. Chills and bilious fever appear soon after the fourth, and are so easily cured that the doctor begins to think he has learned just how to do it. A flattering illusion to be rudely dissipated when his bilious lapses into continued fever and his chills return every seven or fourteen days with compound interest. In malaria the first come are the best served, and woe be to the eleventh hour patients.

If the summer is healthy, no less pre-eminently is the autumn the sickly season, and this remark is true not only of Berrien county, but of New England and every part of the Union which I have visited. Then we begin to talk about the marshes and the green scum on water as if water were hardly fit for navigation purposes, while the average Bostonian goes crazy on the subject of drainage, cess-pools and wells within sight of a vault. In spite of all this tirade, the worst cases of dysentery and typhoid fever I ever saw were in New England at a season when the ground was baked to an unknown depth, and every drop of water used in the family was drawn from a rapid stream a half mile distant and 100 feet below.

I classify the more generally prevailing endemic diseases of the county as follows, and in frequency, in the order in which they are written:

Autumn—Intermittent fever, remittent fever, diarrhea, dysentery, typho-malarial.

Winter—Bronchitis, diphtheria, pneumonia, pleuritis, remittent fever, intermittent fever, rheumatism, typho-malarial fever.

Spring—Bronchitis, pneumonia, diphtheria, intermittent fever, remittent fever, rheumatism.

CONTAGIOUS DISEASES AND EPIDEMICS.

Among the contagious diseases worthy of mention, the following have had a wide-spread prevalence: Mumps, measles, whooping-cough, scarlet fever.

Well defined epidemics are reported of mumps and erysipelas; a few cases of cerebro-spinal meningitis are reported. No case of variola has been mentioned. Mumps of a very severe type prevailed during the winter and spring. The large percentage of metastasis is everywhere spoken of. As I have heard of no case of accident or death, although viewed by the people with the greatest alarm, I conclude that Prof. Flint is right in pronouncing it a trifling complaint.

Erysipelas, Epidemic of.—Erysipelas is reported everywhere [in Berrien county], and epidemic in the south west. The following account from the practice of Dr. Dunning, of New Troy, is peculiar and interesting, and I cannot do better than give it in the Doctor's own words. "There was quite a difference in the symptoms of different cases, but they may be arranged properly by separating into two classes, viz.: 1st. Those cases in which erysipelatous inflammation chiefly in the throat and face; 2d. Cases in which the erysipelas was located or manifested itself at other points. There was a striking similarity in the symptoms and course of all cases coming under the first class. The patient complained for about 24 hours of pain in head and back, and great uneasiness. At the end of this time there was a well marked chill, with nausea and sometimes vomiting, and a difficulty in breathing. The patient complained of pain in the throat from the commencement of the chill.

"In some instances the throat had been sore before; but usually it had not been noticed until this time. The chill was followed by fever which was not very intense, though the patient was delirious from the commencement. The throat, if examined early, was found to be very much swollen. The swelling was confined usually, at first, to the pharynx and tonsils, but gradually extended until the whole mucous membrane of the mouth and throat was involved. The course which the inflammation now took was peculiar. It extended up the posterior nares, along the schneiderian mem-

brane, and made its exit at the nostrils. Its first appearance upon the face was upon the alæ of the nose, and from them it extended rapidly over the face. In the five cases which I attended, there was no exception to this. They all pursued the same course. Two or three days elapsed from the onset of the attack,—from the commencement of the chill,—before the erysipelas showed itself on the face. During this time the fever pursued an even course, without remission or intermission, the temperature being about 102° Fah., and the pulse from 100 to 105. When the face became involved the temperature increased to from 103° to 104° Fah., and the pulse, in some instances, reached 120. In one case, which proved fatal, the temperature did not increase, but the pulse was 130 to 138 per minute. When inflammation was established upon the face, the mucous membrane of the throat and nasal cavity gradually became relieved in all cases except the one which was fatal. In that case it assumed a livid hue, which became darker and darker until death took place, which was the 8th day after onset. In the favorable cases the erysipelas reached its height about the 6th day, and then gradually diminished, and the patient became convalescent about the 10th day. In the fatal case there was great prostration about the 4th day, and after the 6th day there was œdema of the glottis, which latter, I believe, was the immediate cause of death.

"In the second class of cases, there was in a few instances slight inflammation of the pharynx; usually, however, there was none. A chill ushered in the attack, and was followed by a fever which ran the same course as in the first class. The erysipelas showed itself in from 2 to 3 days from the onset and ran its course in about 5 days, the fever and erysipelas subsiding at the same time." From which the doctor draws the following conclusions: "1. The erysipelas was not local since the constitutional symptoms were concurrent with or previous to the local manifestations. 2. The erysipelatous fever was epidemic as shown by the number of cases—5 of first class and about 15 of second class, and similarity of symptoms and course."

CANCER.

During the past year there have been two cases of cancer of the stomach, and common report speaks of others known or suspected to be the same. Autopsy revealed in both about the same state of things. The bulk of the walls of the stomach consisted of a sanious mass, the cardiac orifices reduced to a stiff tube of the same, but both orifices still pervious. Large spots of the inner surface were denuded and bleeding. At other spots destructive ulceration was going on. In one perforation had taken place. In this the disease was quite confined to the stomach,—the other organs being healthy. The diaphragm, omentum and intestines, including even the rectum of the other, were found thickly studded with scirrhous nodules of secondary formation. Both were middle aged men of previous good health and habits. I judge the disease run a course of about one year. They were both emaciated, but one more so than the other. The one whose surroundings were the most comfortable, and who had the most contented mind, saved his flesh. The great Napoleon died of this disease in almost full flesh. Mental disturbance wastes the flesh faster than pain or fasting. How, then, shall we recognize cancer of the stomach? In the early stages, however much our suspicion may be aroused, we necessarily grope a good deal in the dark. In the course of one day hardly a symptom will arise which may not be referred to some other disease. In one of these cases one of the most distressing symptoms was a periodical headache, which followed him to the last. By observing the following symptoms we will not go far astray: Distress referred to the region of the stomach, which never lets up, but increases in intensity day by day, and week by week. This distress is sometimes vague and ill defined, and sometimes lancinating. The act of eating is followed by pain; so much so that the patient nearly starves himself to avoid the agony. The stomach bears but little food. A morsel fills it. But the symptom on which I would place the most reliance is the appearance in the vomit or dejections of sanious, purulent or coffee-ground matters. By this time we have generally marked emaciation and the cancerous complexion.

I have solicited accounts of "anything new" in medical practice, and under this head Dr. Scott reports the following: "There has come under my notice for several years, but more particularly during the last two years, a kind of rheumatic condition of the walls of the chest. The patient complains of a dull heavy pain in the chest walls. The disease, in a large majority of cases is confined to the left side. The pain is circumscribed and limited to a space of not more than two inches in diameter, just below and a little to the left of the left nipple. At times the pain is very severe, and always constant day and night, when the patient is awake. I have investigated

the disease to some extent, and find it to be more common among tobacco users, especially those who use the weed to excess. Patients suffering from this complaint invariably come to their physician with the belief that they have heart trouble. I have not found signs of organic lesion in any of the cases that I have examined, but there does exist in some of them what might be called "irritable heart." I am convinced that the greater number of these cases are the result of intemperance either in the use of tobacco or other stimulants, for the reason that when the patient abstains from the use of them for a short time, his pain ceases and his condition improves. In one case where the patient abstained from the use of tobacco for thirteen months, the pain entirely ceased, but at the end of this period the gentleman re-commenced the use of tobacco, and after three weeks' use the old pain returned with all its severity. I simply call your attention to this trouble that I may get your views upon it, for I have been unable to find any such case reported. I am certain that quite a number in this vicinity are receiving treatment for heart disease when if they would reform in tobacco using they would speedily recover."

This report would be incomplete did it not mention the severe and continued cold weather of the past winter, and its effect on the people. This particular period embraced the month of January and the first half of February, and this was far from being all. During this time there was but one thaw, and that soon and suddenly followed by intense cold. The thermometer went as low as 26° below zero in the East, and 20° on the Lake Shore, while for days together it would stand at or below zero. The average person subjected to such an atmosphere develops a redness of the mucous membrane of the air passages which shades off into catarrh, bronchitis or pneumonia. Even in the milder cases a febrile condition is set up, and the burden of excretion is thrown on the internal organs, and the subject is soon more or less jaundiced or bilious looking. Pains of a rheumatic character are developed. There was a wide spread affection of the air passages in children and persons in feeble health. Most of them presented the ordinary symptoms of cold, coryza and nasal catarrh. In other cases bronchitis more or less extensive is developed, and attending this great constitutional disturbance, such as chill and fever. In still other cases pneumonia generally severe in character, and often running a rapidly fatal course. This state of things, although bad enough here, is reported as much worse in the interior and Eastern States than here, probably from the fact that the coolness of the air is somewhat mitigated here by the propinquity of the great lakes.

St. Joseph, Mich. R. F. STRATTON, M. D.

REPLIES BY H. W. BROWNE, M. D., OF HUBBARDSTON, MICH.

Secretary of the State Board of Health:

SIR:—I herewith transmit such replies to questions contained in Circular No. 11, from your office, as I am able to make. I hope they may contribute a little to the general good: *

1. Much less,—cannot give figures. The deaths are not reported to the local boards in very many cases. There is no record of deaths in the township clerk's office of the township of North Plain. Could probably obtain the necessary information from the supervisors when they return their assessment rolls.

2. I should say the proportion of deaths was small.

3. I should say there has been no one cause more than usually prevalent. There have been few malignant and fatal cases of disease. They occur as epidemics about every third year (1874 the last).

4. Zymotic diseases.

5. Cannot say there has been more than the usual mortality.

6. Malignant types of fever (I judge).

7. For obvious reasons it is difficult to get reliable statistics from other physicians, consequently I can give as positive only what has occurred in my own practice. I have heard of cases of scarlet fever, typhoid fever, cerebro-spinal meningitis and diphtheria in the neighboring townships, but have no figures. Do not find such reported at the township clerk's offices. My opinion is that the above named diseases have been less prevalent in 1875 than in previous years.

8. Cannot state.

9. See summary, as follows:

*The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

MONTHS—1875.	Disease.	Cases.	Deaths.	Remarks.
January	Pernicious fever	1	1	First case known here.
	Pneumonia	4		
	Typhoid pneumonia	3	1	
February	Measles	4		
March	Whooping-cough	6		Taken sick in March.
April	Scarlet fever	2		" " "
	Consumption	2	2	" " "
May	Influenza	1		
	Intermittent fever	14		Brief duration.
June	Catarrh	4		
July	Remittent fever	5	1	Taken sick.
August	Remittent fever	3	*1	" "
	Dysentery	5	1	Child 10 months old
September	Dysentery	2		
	Bilious remittent fever	3		
October	Typhoid fever	3		
November	Malarial	10		Unclassified.
December	Unclassified	10		
Total		82	7	

* Malignant type.

This table relates to my own practice only.

I have given in this summary those diseases which may be said to be "dangerous to the public health," and as accurately as I have records. It would be impossible for me to give a summary of all the cases of disease which I have attended during the year, as I have records only of the most important. It may be remarked that the fever cases (typhoid and dysentery) were of a mild type, comparatively. The diseases unclassified have exhibited a periodic character, and I have given them under the general name, malarial, as none were fatal, and yielded readily to quinine. Not all of the diseases I have given would be called dangerous, but they seem to spring from the same specific cause, unless those which are clearly of a malarial origin should be excluded.

10. Pernicious fever; 1 case fatal.

11. No prevailing disease.

12. Several deaths just now; mostly old people and chronic cases.

13. The disease popularly known as the epizoötic so prevalent in 1873, appeared among horses in the spring and early summer. I have seen one, and heard of other cases of what I should call ague or chill in cows; no fatal case. Have heard of the coup, so called, in hens; some species of cynanche, I should judge. One man has had six hogs attacked with what he calls "The Blind Staggers." There has been no epidemic sickness among animals so far as I know.

14. The crops generally were secured in good condition; potatoes were especially good. Have learned of no disease of the fruits. Hops were of good quality, but a short crop, I have been told.

15. No rye is raised about here. Oats were good; the crop was short, but good. Corn crop was not so good; much was frozen early in the fall; a good deal has been lost by mould since it was housed. I saw in many fields while growing a kind of black fungus. Wheat in this vicinity was excellent.

16. Wheat was in good shape last harvest. The season was quite dry. I have learned of no wheat wet when threshed.

17. "Banks" less than usual.

18. Hay crop was secured in better shape than usual, owing to the dry weather.

20. I think if the law were amended so as to make it obligatory upon the local boards to organize, much might be done to make the laws more effective in the prevention of disease. It is true that the statute creates the local boards of health; but these boards do not organize. In none of the towns in this vicinity have they acted (to my knowledge) as a board of health, or have they appointed a health officer. Much of the sickness, I think, may be traced to the privies, from which exhale, in hot weather, mephitic gases, and to the decaying vegetable matter along the margin of the streams. If there were a health officer to notify the people to remedy this state

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

of things, it would, I am convinced, if carried out, remove one of the causes of disease.

One of the causes of disease in the villages situated along Fish Creek, so called, I think is the location of these villages upon the easterly side of that stream, as during a great part of the year our prevailing winds are from the west and southwest, and the products of decomposing organic matter from the decaying vegetable matter along the banks of the stream, the eastern side at any rate, is borne by the winds upon the town, and some times when the water is low there is a stench borne to our nostrils which is nearly insupportable.

Yours respectfully,

Hubbardston, Mich., April 24, 1876. H. W. BROWNE.

REPLIES BY EDWARD BATWELL, M. D., OF YPSILANTI, MICH.

Answer to Circular No. 11. *

1. Our population does not increase rapidly, but fluctuates in proportion to the number attending our Normal and union schools. Carefully analyzing the amount of sickness for 1874 and comparing it with that of 1875, we find a decrease of fully ten per cent. in the amount of illness in our locality for 1875.

2. The proportion of deaths was also less, though a large number of the old inhabitants, for which this county is remarkable, seemed calmly and quietly to pass away without any appreciable reason.

3. Consumption of lungs seemed particularly prevalent and rife among us, and was the cause of fully seven-tenths of the deaths among our younger inhabitants.

5. Consumption.

7. Six cases of small-pox and two of varioloid. Two proved fatal. Scarlet fever, as an epidemic, did not prevail, though many sporadic cases presented themselves. Pure gastro-enteric fever was rare, though some bilious remittents assumed a typhoid character. One curious point presented itself in the small-pox cases, which was the difficulty of tracing the cases, or at least the most of them, to direct contagion or exposure.

8, 10. Cholera, cerebro-spinal meningitis and whooping-cough did not exhibit themselves, but erysipelas of a phlegmonous character, although not an epidemic, seemed to be quite prevalent during the months of October and November, at which time a few cases of puerperal peritonitis came under my observation, a disease rarely met with in this locality.

11. Bilious remittent and mild intermittents.

13. Mild epizoötic among horses.

15. Wheat was of a fair character, though "shrunk" wheat was prevalent in this county.

16. It was; the low prices deterring farmers from early threshing.

18. The very best cured hay was mouldy and *dusty*, and deeming it unfit for the horses I drive, I fed them corn stalks and oat straw, one feed of hay invariably causing them to cough and run at the nose.

In conclusion I would beg to state that the above facts are arrived at from interchange of views with all our resident practitioners.

The points in question No. 7 are furnished from data that have been given to me as health officer of the city.

Ypsilanti, Michigan. EDWARD BATWELL, M. D.

REPLIES BY JOHN P. WILSON, M. D., PONTIAC, MICH.

Replies to Circular No. 11, prevailing diseases of 1875.*

1. Rather less, in my opinion.

2. Less; 44 deaths in 1874, 43 in 1875.

3, 4, 5, 6. Nothing unusual, in my opinion.

7. Three cases of small-pox near, but not in city. No contagious or infectious disease has been either epidemic or endemic, but have had a few cases (cannot say how many) of all enumerated, except cholera, and in addition 3 cases of puerperal fever.

8. Asiatic cholera.

9. Have not the data.

* The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

10. None occurred.
11. Unanswered,—being now July, 1876.
12. December, January and February, 1875-76. Influenza with sore throat and with swelling of glands of the neck, inclining to diphtheria.
13. The so-called epizoötic among horses—slightly.
14. None among root-crops or fruits; cereals and grasses of the best quality.
15. Wheat never in better order, either in quality or condition.
16. Yes.
17. No liability to "bank" in bin.
18. Less than usual.
19. Winter months, cold, extreme; first half of summer warm and dry; Aug. and Sept. cool and wet; up to January, 1876, open weather, with no extreme cold.

Pontiac, Mich. JOHN P. WILSON, M. D.

REPLIES BY O. MARSHALL, M. D., OF NORTH LANSING, MICH.

Secretary of the State Board of Health:

DEAR SIR:—In reply to Circular No. 11, relative to prevailing diseases:*
1. With the exception of scarlet fever, less.
2. About an average.
3. Scarlet fever.
4. Diarrhea, dysentery, cholera morbus, cholera infantum, and diseases of the digestive organs of children with their *sequelæ*.
5. Scarlet fever.
6. Dysentery, cholera infantum, diarrhea, and pneumonia.
7. Scarlet fever 133, typhoid fever 13, spinal meningitis 2, measles 2.
8. Small-pox, cholera.
9. ——.
10. Scarlet fever prevailed with great malignancy in the months of November and December. There were 84 cases of the disease in the two months, 16 of whom died.
11. Whooping cough, intestinal and malarious diseases.
12. No.
13. Influenza among horses in the winter.
14. Crops of unusual good quality. Potatoes somewhat affected with "rot."
15. Not affected with fungus to any noticeable extent.
16. Yes.
17. No.
18. Less.
19. ——.
20. Refer you to my report on epidemic of scarlet fever at North Lansing, 1875-6.†

North Lansing, Aug. 26, 1876. O. MARSHALL.

REPLIES BY J. M. LOOP, M. D., OF PORT SANILAC, MICH.

Answers to Circular No. 11, relative to prevailing diseases.*
1. Greater. Increased about one-third.
2. Increased about one-eighth.
3. Scarlatina.
4. Dysentery.
5. Consumption.
6. Rheumatism.
7. Small-pox, none; cholera, none; cerebro-spinal meningitis, none.
Scarlet fever, measles, whooping-cough, and diphtheria were the *prevailing* diseases. I cannot well give the number of cases; they were quite numerous, and mostly in the months of November and December, and were of a tolerably mild grade.
8. Small-pox, cholera, cerebro-spinal meningitis.
11. Bowel complaints.
12. No.
13. Epizoötic, or an influenza commonly called *horse distemper*.

*The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.
† Published in this Report. See pages 41-52 of this volume.

14. Smut was common in cereals.
15. Most kinds of grain were affected with fungi.
16. No.
17. Yes.
18. Very well made and secured.

Port Sanilac, Michigan. J. M. LOOP, M. D.

REPLIES BY A. W. ALVORD, M. D., OF CLINTON, MICH.

Secretary of the State Board of Health:

DEAR SIR:—In reply to your Circular relative to prevailing diseases:*

1. Sickness during 1875, less by 25 per cent. than average years.
2. Ten per cent. less.
3. None.
4. Typhoid fever, pneumonia. The water supply was unusually regular.
5. None.
6. Cholera infantum, typhoid fever, croup, dysentery.
7. Scarlatina, 30; typhoid fever, 20; measles, 50; whooping-cough, 12; cerebro-spinal meningitis, 9; diphtheria, 25. No epidemics (my opinion).
8. Small-pox, cholera.
9. During winter and early spring, pneumonia and bronchitis, marked by typhoid characteristics; during August, September, and October, dysentery and bilious fevers and a little typhoid fever; also some typho-malarial.
10. No unusual disease occurred. It was a very healthy year.
11. None, especially.
12. None.
13. A form of influenza prevailed among animals, both spring and fall, but was not fatal, not to a great extent.
14. Wheat rusted some, and grass was somewhat mouldy.
15. Wheat was a little "grown," otherwise good.
16. Not as dry as it should be.
18. Average.
19. Cannot.

You will readily see that it is quite impossible to give anything like full answers to your questions, not knowing what was likely to be asked for, and therefore not prepared. The above answers are opinions as I can best give them.

Ever yours,

Clinton, Mich., Nov. 8, 1876. A. W. ALVORD.

*The figures beginning paragraphs refer to questions in Circular [11], printed on pages 152-3 of this Report.

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ERRATA: On page xlviii, in the sixth line, the fifth word should be "at" instead of "as."

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